

PROGRAMME OF EDUCATION

FACULTY: Civil Engineering

MAIN FIELD OF STUDY: civil engineering

in area of technical science

EDUCATION LEVEL: ~~1st / 2nd~~ * level, ~~licencjat / inżynier / magister~~ / magister inżynier (MSc) studies*

FORM OF STUDIES: full-time / ~~part-time~~*

PROFILE: general academic / ~~practical~~ *

SPECIALIZATION*: Civil Engineering

LANGUAGE OF STUDY: English

Content:

1. Assumed educational outcomes – appendix no 1.
2. Programme of studies – appendix no 2.

Faculty Council resolution no. 283/28/2012 from 25.04.2012

Faculty Council resolution no. 21/1/2012-2016 from 26.09.2012

Faculty Council resolution no. 117/8/2012-2016 from 27.03.2013

In effect since 1.10.2012

*delete as applicable

I. EDUCATION OUTCOMES

for the Civil Engineering Faculty second level studies – general academic profile

The Faculty of Civil Engineering Wroclaw University of Technology – 2012/13

1. Area descriptors included in the faculty description

In the description of the Civil Engineering Faculty for second level studies all education outcomes which come from the outcome description for the technical studies area have been included. The existing Faculty of Civil Engineering is only associated with the area of education which refers to technical science and the defined faculty education outcomes fulfill all the demands which are defined in this area. It means that all engineering competence is covered automatically by faculty education outcomes. The description of second level studies collectively includes outcomes for both levels of studies.

A graduate of second level studies must be competent in the areas defined by the education outcomes listed below. This does not mean, however, that all of these outcomes must be achieved as a result of the second level studies; some part of it may be achieved after finishing the first level studies and also - in a limited extent - as a result of non-formal and informal learning.

2. Education outcomes

2.1. General education outcomes

After finishing second level studies with general academic profile in the Civil Engineering Faculty, a graduate, using his acquired knowledge and skills is ready to make decisions regarding the appropriate usage of materials, construction design and construction projects. He knows the current trends in the design and execution of building projects. He uses principles of occupational health and safety. He is able to design buildings, knows the principles of structural mechanics and is able to formulate, create, and then use the appropriate computational models of complex engineering structures. He can make and read technical drawings, recognize geodesy and cartography documentations and manage construction works. He is able to formulate and solve new engineering, technical and organizational issues related to civil engineering. He can use modern computer aided technics in the design of constructional structures and projects. He can critically select arguments supporting collective decisions related to the execution of tasks in civil engineering. He is able to formulate and publish reports on the progress of carried out works. He is able to work in a team and supervise a team's duties. He is responsible for the safety of a supervised team. He is aware of the need to improve his professional and personal

competence. He follows ethical rules. He knows and uses the principles of construction law. He has language skills in the fields of science and scientific disciplines relevant to the studied faculty and requirements for B+ level of the Common European Framework of Reference for Languages. He is prepared to continue his education at third level studies. Graduates are able to: solve complex design, organizational and technological issues, formulate and carry out research programs, run projects of international scope, participate in the marketing and promotion of building products, continue their education and participate in research and disciplines directly related to civil engineering and building production, constantly update their qualifications and knowledge and also manage large groups of people. Graduates are qualified to take a job in: construction and design offices, executive enterprises, research institutes and development centres and also guidance institutions disseminating knowledge from civil engineering.

Futhermore, graduates of each specialization achieve additional extended competence referring to the education outcomes for their specialization:

The specialization of **Civil Engineering** carried out in English language provides graduates with extensive knowledge and competency in the area of the design and execution of multiple building structures such as: complex structures with reinforced concrete or metal constructions, housing buildings, municipal constructions, roads and highways, bridges and also objects of railway infrastructures. Furthermore, a graduate possesses extensive knowledge in the area of Hydraulic issues and also computer aided design. Each graduate can achieve more knowledge about the chosen constructions after choosing one of the wide range of modules that are on offer.

2.2. Specific education outcomes

Description of symbols used in shortcuts :

K2 – Faculty educational outcomes

W – category of knowledge

U – category of skills

K (after underscore) – category of social competences

K2S – educational outcomes related to the specialization:

CEB – references according to the specialization: Civil Engineering

T2A_ – educational outcomes in the field of technical science for the second level study

DESCRIPTION OF EDUCATION OUTCOMES

TABLE OF REFERENCES OF FACULTY FIELD OF STUDY OUTCOMES AND FIELD OUTCOMES

Symbol of education outcomes for the faculty field of study (K2_)	Description of faculty field of study education outcomes for the academic profile. After finishing second level studies on the Civil Engineering Faculty a graduate:	Reference to the education outcomes for the field of technical sciences (T2A_)
KNOWLEDGE		
K2_W01	possesses necessary and advanced knowledge from selected fields of mathematics and physics which is required for studying material strength and mechanics including dynamics and theory of building construction.	T2A_W01
K2_W02	possesses extensive knowledge of advanced issues in the areas of material strength and material modeling	T2A_W01, T2A_W02, T2A_W04, T2A_W05
K2_W03	possesses appropriate and sufficient knowledge of the theoretical basis of the finite element method and the general principles of carrying out non-linear calculations of engineering constructions.	T2A_W01, T2A_W02, T2A_W04, T2A_W05, T2A_W07
K2_W04	knows to the necessary extent the basics of continuous media mechanics; the principles of structural analysis issues; the stability of complex rod, slab, disk, shell and solid structures and also the dynamics of these types of constructions with a number of dynamic freedom degrees, which refers to discrete systems	T2A_W01, T2A_W04
K2_W05	possesses basic knowledge of theoretical analysis, construction optimization and also the design of complex structural systems	T2A_W01, T2A_W04, T2A_W07
K2_W06	knows the standards, guidelines and regulations referring to the design of buildings and their components	T2A_W03, T2A_W04, T2A_W06
K2_W07	knows the principles of analysis, construction and dimensioning of complex metal and reinforced concrete building structures	T2A_W02, T2A_W03, T2A_W04, T2A_W05, T2A_W07
K2_W08	knows the principles relating to the foundations of complex buildings	T2A_W02, T2A_W03, T2A_W07
K2_W09	knows the classification and the scope of usage of computer programs aiding the analysis and design of complex building structures	T2A_W02, T2A_W03, T2A_W04, T2A_W07

K2_W10	knows the modern building materials currently in use and the basics of manufacturing them	T2A_W02, T2A_W03, T2A_W05, T2A_W06
K2_W11	knows the principles of procedure formation in the management of quality construction projects; possesses knowledge about ways of executing complicated construction works and building structures; knows the principles of normalization and standardization in the construction industry; possesses knowledge about the effectiveness of the cost and time of investment execution; knows programs useful for the planning of construction projects	T2A_W02, T2A_W06, T2A_W09
K2_W12	possesses comprehensive knowledge related to running a business in the building industry; understands the principles of financial management of enterprises	T2A_W09, T2A_W11
K2_W13	possesses knowledge about the influence of building investments on the environment	T2A_W05, T2A_W06, T2A_W08
K2_W14	knows the principles of construction law and occupational health and safety	T2A_W02, T2A_W08
K2_W15	knows the elements of the law referring to patents and protection of intellectual property and also the rules of professional ethics	T2A_W10
	<p>achieves results in the KNOWLEDGE category in one of the following specializations:</p> <ul style="list-style-type: none"> • carried out in English language: <p>- Civil Engineering (K2S_CEB_W) (appendix 9)</p>	

	SKILLS	
K2_U01	is able to use advanced specialized tools when searching Internet databases and other sources which can be used to find both general information and other information related to civil engineering; is able to use information technology to communicate and know how to obtain software which is used to aid the work of a designer and the person organizing and managing building processes	T2A_U01, T2A_U02, T2A_U03, T2A_U04, T2A_U06, T2A_U07
K2_U02	possesses language skills related to the field of study and in accordance with the requirements for B2+ level of the CEFR; is able to communicate in foreign languages including technical language referring to civil engineering	T2A_U01, T2A_U02, T2A_U03, T2A_U04, T2A_U06
K2_U03	is able to decide on the direction of his further education and carry out a process of self-education	T2A_U01, T2A_U05
K2_U04	is able to classify simple and complex building structures	T2_U07, T2A_U17, T2A_U18
K2_U05	is able to make an evaluation and configuration of all types of loads applied to building structures with their appropriate combinations	T2A_U10, T2A_U17
K2_U06	is able to carry out classical structural analysis and stability analysis of rod structures (trusses, frames and tension rods) which are statically determinate and indeterminate and also of surface structures (disks, slabs, membranes, shells and solid elements); is able to carry out dynamic analysis of these types of structures, which have a number of dynamic freedom degrees, and refer to discrete systems	T2A_U09, T2A_U17, T2A_U18, T2A_U19
K2_U07	is able to correctly define a computational model in the finite element method environment and carry out advanced analysis of complex engineering structures in the linear scope and use nonlinear calculation techniques at a basic level	T2A_U09, T2A_U10, T2A_U11, T2A_U12, T2A_U15, T2A_U18
K2_U08	is able to solve complex issues in selected fields of mathematics which are the basis for advanced methods of construction analysis; is able to choose a tool (analytical or numerical) in order to solve engineering issues; is able to use selected software which aid modeling and design processes in construction	T2A_U07, T2A_U08, T2A_U09, T2A_U10, T2A_U12, T2A_U15
K2_U09	is able to critically assess the results of numerical analysis of complex engineering structures	T2A_U08, T2A_U12, T2A_U16, T2A_U18
K2_U10	is able to design complex foundations for building structures	T2A_U09, T2A_U10, T2A_U12, T2A_U17, T2A_U18, T2A_U19

K2_U11	is able to model and design complicated elements and complex metal and reinforced concrete structures	T2A_U10, T2A_U12, T2A_U16, T2A_U17, T2A_U18, T2A_U19
K2_U12	is able to prepare graphic design documentation in a selected graphic software environment	T2A_U02, T2A_U04, T2A_U07, T2A_U19
K2_U13	is able to formulate a schedule of construction work, estimate the cost of a building investment and also evaluate the effectiveness of construction projects	T2A_U02, T2A_U07, T2A_U10, T2A_U13, T2A_U14, T2A_K03
K2_U14	is able to assess the risks in the execution of construction projects and implement appropriate security policies; is able to formulate standards, norms of work and quality management procedures	T2A_U02, T2A_U10, T2A_U13, T2A_U14, T2A_K03
K2_U15	is able to plan and carry out laboratory experiments leading to the evaluation of the quality of used materials and the strength assessment of a structure's elements	T2A_U08, T2A_U09, T2A_U11, T2A_U15, T2A_U16
K2_U16	is able, according to scientific principles and using his scientific experience, to formulate and carry out preliminary research works leading to solutions of engineering, technological and organizational issues referring to civil engineering	T2A_U01, T2A_U08, T2A_U15, T2A_U17, T2A_U18, T2A_U19
K2_U17	is able to plan, prepare and carry out research and also formulate elaborations which prepare him to undertake scientific work	T2A_U01, T2A_U03, T2A_U05, T2A_U07, T2A_U08, T2A_U09, T2A_U10, T2A_U116, T2A_U17, T2A_U18
	achieves results in the SKILL category in one of the following specializations: <ul style="list-style-type: none"> • carried out in English language: - Civil Engineering (K2S_CEB_U) (appendix 9)	

	SOCIAL COMPETENCY	
K2_K01	is aware of the need to constantly upgrade professional and personal competence in the form of formal or informal education and also improves and develops knowledge in the area of modern processes and technology, related to civil engineering	T2A_K01
K2_K02	is aware of the importance and also understands non-technical aspects and consequences of engineering activity, including influence on the environment and responsibility for implemented decisions	T2A_K02
K2_K03	is able to work independently and cooperate in a team on a specific task; is responsible for both the safety of his work and his subjected team's work	T2A_K03
K2_K04	is aware of the importance of behaving in a professional way and following ethical values; correctly identifies and resolves dilemmas referring to his profession; is able to formulate priorities when executing tasks specified by himself or others	T2A_K04, T2A_K05
K2_K05	is able to think and act in an entrepreneurial manner	T2A_K06
K2_K06	is aware of the social role of a technical university graduate; understands the need to communicate with the public and formulate, especially through mass media, information and opinion regarding achievements of technology and other aspects of engineering activity; attempts to provide such information and opinions in a widely understood manner with explanation of different points of view	T2A_K07

Appendix 9**Specific education outcomes for the specialization “Civil Engineering” on the *Faculty of Civil Engineering***

Symbol of education outcomes for the specialization CEB (K2S_ CEB _)	Description of specialization education outcomes for the general academic profile. After finishing second level studies in the Faculty of Civil Engineering and specialization “Civil Engineering” a graduate acquires the following additional education outcomes:	Reference to the education outcomes for the field of technical sciences (T2A_)
KNOWLEDGE		
K2S_CEB_W16	has deep and extensive knowledge in the area of analysis, dimensioning and construction of complex civil engineering metal and reinforced concrete constructions	T2A_W02, T2A_W03, T2A_W04, T2A_W05, T2A_W07
K2S_CEB_W17	has additional knowledge referring to hydraulic issues	T2A_W02, T2A_W03, T2A_W04, T2A_W07
K2S_CEB_W18	has extensive knowledge in the area of municipal cubic constructions	T2A_W02, T2A_W03, T2A_W04, T2A_W07
K2S_CEB_W19	has extensive knowledge in the area of road, bridge and rail constructions	T2A_W02, T2A_W03, T2A_W04, T2A_W07
K2S_CEB_W20	has extensive knowledge in the area of constructions connected to urban engineering	T2A_W02, T2A_W03, T2A_W04, T2A_W07
K2S_CEB_W21	has extensive knowledge in the area of construction works technology	T2A_W02, T2A_W03, T2A_W04, T2A_W06
K2S_CEB_W22	has extensive knowledge in the area of selected elements, constructions and building structures (<i>subjects from elective modules</i>)	T2A_W02, T2A_W03, T2A_W04, T2A_W07
SKILLS		
K2S_CEB_U18	has skills to analyze, dimension and construct metal and reinforced concrete complex civil engineering constructions	T2A_U10, T2A_U12, T2A_U16, T2A_U17, T2A_U18, T2A_U19

K2S_CEB_U19	is able to use advanced computational techniques, including optimization, in modeling and calculating complex building constructions	T2A_U17, T2A_U18
K2S_CEB_U20	is able to design selected elements of geotechnical structures including hydraulic issues	T2A_U10, T2A_U17, T2A_U18
K2S_CEB_U21	is able to design and carry out research on elements and materials in civil engineering	T2A_U08, T2A_U09, T2A_U11, T2A_U18
K2S_CEB_U22	has skills to design selected elements of road, bridge, rail and also urban engineering constructions in the area related to civil engineering	T2A_U10, T2A_U17, T2A_U18, T2A_U19
K2S_CEB_U23	has skills to solve tasks referring to selected theoretical issues and also design elements, constructions and building structures (<i>subjects from elective modules</i>)	T2A_U10, T2A_U17, T2A_U18, T2A_U19

**MATRIX OF CORRELATION
BETWEEN
EDUCATION OUTCOMES FOR THE FIELD OF TECHNICAL SCIENCE
AND FACULTY EDUCATION OUTCOMES**

**for the field of study *Civil Engineering*
second level studies – general academic profile**

**The Department of Civil Engineering
Wroclaw University of Technology – 2012/13**

Description of symbols used in shortcuts :

K2 – Faculty educational outcomes

W – category of knowledge

U – category of skills

K (after underscore) – category of social competences

K2S – educational outcomes related to the specialization:

CEB – references according to the specialization: Civil Engineering

T2A_ – educational outcomes in the field of technical sciences for the second level study

MATRIX OF CORRELATION BETWEEN EDUCATION OUTCOMES FOR THE FIELD OF TECHNICAL SCIENCE AND FACULTY EDUCATION OUTCOMES

Specialization: Civil Engineering

Symbol of education outcomes for the field of technical sciences	Description of education outcomes for the field of technical sciences	Reference to education outcomes for the faculty field of study “civil engineering”
KNOWLEDGE		
T2A_W01	has expanded and broadened knowledge of mathematics, physics and chemistry and other areas related to the studied discipline necessary to formulate and solve complex tasks in the field of the studied discipline	K2_W01, K2_W02, K2_W03, K2_W04, K2_W05
T2A_W02	has detailed knowledge in the field of study related to the studied discipline	K2_W02, K2_W03, K2_W07, K2_W08, K2_W09, K2_W10, K2_W11, K2_W14, K2S_CEB_W16, K2S_CEB_W17, K2S_CEB_W18, K2S_CEB_W19, K2S_CEB_W20, K2S_CEB_W21, K2S_CEB_W22
T2A_W03	has organized, general knowledge and theoretical grounding including key issues related to the studied discipline	K2_W06, K2_W07, K2_W08, K2_W09, K2_W10, K2S_CEB_W16, K2S_CEB_W17, K2S_CEB_W18, K2S_CEB_W19, K2S_CEB_W20, K2S_CEB_W21, K2S_CEB_W22
T2A_W04	has detailed knowledge and theoretical grounding connected with the chosen issues in the field of the studied discipline	K2_W02, K2_W03, K2_W04, K2_W05, K2_W06, K2_W07, K2_W09, K2S_CEB_W16, K2S_CEB_W17, K2S_CEB_W18, K2S_CEB_W19, K2S_CEB_W20, K2S_CEB_W21, K2S_CEB_W22
T2A_W05	has knowledge of trends in development and the most crucial and newest achievements in scientific disciplines and fields of study related to the studied discipline and other related scientific disciplines	K2_W02, K2_W03, K2_W07, K2_W10, K2_W13, K2S_CEB_W16

T2A_W06	has fundamental knowledge of the lifecycle of devices, objects and technical systems	K2_W06, K2_W10, K2_W11, K2_W13, K2S_CEB_W21
T2A_W07	knows fundamental methods, techniques, tools and materials used for solving simple engineering tasks in the field of the studied discipline	K2_W03, K2_W05, K2_W07, K2_W08, K2_W09, K2S_CEB_W16, K2S_CEB_W17, K2S_CEB_W18, K2S_CEB_W19, K2S_CEB_W20, K2S_CEB_W22
T2A_W08	has fundamental knowledge necessary to understand social, economical, legal and other non-technical factors of engineering activities as well as taking them into consideration in engineering practice	K2_W13, K2_W14,
T2A_W09	has fundamental knowledge of management, including quality management and running a business	K2_W11, K2_W12,
T2A_W10	knows and understands basic concepts and rules related to industrial property protection and copyright laws and knows the necessity of these laws and rules in managing intellectual property resources; is able to use patent information resources	K2_W15
T2A_W11	knows general rules related to establishing and developing individual entrepreneurial activity, using knowledge of scientific disciplines and fields of study related to the studied discipline	K2_W12
SKILLS		
1) general skills (not related to the area of engineering education)		
T2A_U01	is able to obtain information from literature, databases and other properly selected sources, either in English or another foreign language regarded as a language for international communication in the studied discipline ; is able to integrate obtained information, interpret and critically evaluate it, draw conclusions, formulate and justify opinions in full	K2_U01, K2_U02, K2_U03, K2_U16, K2_U17
T2A_U02	is able to communicate in their professional environment and other environments using various techniques, either in English or another foreign language regarded as a language for international communication in the studied discipline	K2_U01, K2_U02, K2_U12, K2_U13, K2_U14

T2A_U03	is able to prepare a scientific study in Polish language and also a short scientific report, with the results of own research, in a foreign language regarded as a basic one in the scientific disciplines and fields of study related to the studied discipline	K2_U01, K2_U02, K2_U17
T2A_U04	is able to prepare and give an oral presentation concerning detailed issues in the field of the studied discipline both in Polish and a foreign language	K2_U01, K2_U02, K2_U12
T2A_U05	is able to establish directions of further education and follow the process of self-learning	K2_U03, K2_U17
T2A_U06	has language skills in scientific disciplines and fields of study related to the studied discipline according to CEFR requirements for B2+ level	K2_U01, K2_U02
2) fundamental engineering skills		
T2A_U07	is able to use information and communication technologies necessary to perform tasks typical of engineering activities	K2_U01, K2_U08, K2_U12, K2_U13, K2_U17
T2A_U08	is able to plan and run experiments including measurements and computer simulations, interpret results and draw conclusions	K2_U08, K2_U09, K2_U15, K2_U16, K2_U17, K2S_CEB_U21
T2A_U09	is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks as well as simple research problems	K2_U06, K2_U07, K2_U08, K2_U10, K2_U15, K2_U17, K2S_CEB_U21
T2A_U10	is able - while formulating and solving engineering tasks- to integrate knowledge of scientific disciplines and fields of studies appropriate for the specialization and apply the system approach which also takes into account non- technical aspects	K2_U05, K2_U07, K2_U08, K2_U10, K2_U11, K2_U13, K2_U14, K2_U17, K2S_CEB_U18, K2S_CEB_U20, K2S_CEB_U22, K2S_OBU_U23
T2A_U11	is able to formulate and test hypotheses connected with engineering problems and simple research problems	K2_U07, K2_U15, K2_U17, K2S_CEB_U21
T2A_U12	is able to assess the usefulness and possibilities of new achievements (technological and technical) in the field of the studied discipline	K2_U07, K2_U08, K2_U09, K2_U10, K2_U11, K2S_CEB_U18
T2A_U13	is prepared to work in an industry environment and knows safety rules in the workplace	K2_U13, K2_U14

T2A_U14	is able to carry out primary economic analysis of undertaken engineering activities	K2_U13, K2_U14
3) skills directly connected with solving engineering tasks		
T2A_U15	is able to carry out critical analysis of functioning and also assess – particularly in reference to the studied discipline- existing technical solutions, in particular devices, objects, systems, processes, and services	K2_U07, K2_U08, K2_U15, K2_U16
T2A_U16	is able to plan improvements in existing technical solutions	K2_U09, K2_U11, K2_U15, K2S_CEB_U18
T2A_U17	is able to identify and formulate specifications of complex engineering tasks specific for the studied discipline including untypical tasks considering their non-technical aspects	K2_U04, K2_U05, K2_U06, K2_U10, K2_U11, K2_U16, K2_U17, K2S_CEB_U18, K2S_CEB_U19, K2S_CEB_U20, K2S_CEB_U22, K2S_CEB_U23
T2A_U18	is able to assess the usefulness of methods and tools for solving an engineering task specific for the studied discipline, and notice limitations of these methods and tools; is able – by applying conceptually new methods- to solve complex engineering tasks specific for the studied discipline, including untypical tasks and tasks with a research component	K2_U04, K2_U06, K2_U07, K2_U09, K2_U10, K2_U11, K2_U16, K2_U17, K2S_CEB_U18, K2S_CEB_U19, K2S_CEB_U20, K2S_CEB_U21, K2S_CEB_U22, K2S_CEB_U23
T2A_U19	is able – according to a given specification which considers non – technical aspects- to design a complex device, object, system or process specific for the studied discipline and complete this project – at least partially- using appropriate methods, techniques and tools, adapting already existing tools or by creating new tools	K2_U06, K2_U10, K2_U11, K2_U12, K2_U16, K2S_CEB_U19, K2S_CEB_U22, K2S_CEB_U23
SOCIAL COMPETENCES		
T2A_K01	understands the necessity of a lifetime learning process; is able to inspire and organize the process of learning for others	K2_K01
T2A_K02	realizes the significance and understands non-technical aspects and consequences of engineering activity and especially its influence on the natural environment and the related responsibility for decisions	K2_K02
T2A_K03	is able to cooperate and work in a group, taking up different roles	K2_K03

T2A_K04	is able to set clear priorities leading to the realization tasks set by himself or others	K2_K04
T2A_K05	identifies correctly and solves dilemmas connected with the profession	K2_K04
T2A_K06	is able to think and act in an entrepreneurial way	K2_K06
T2A_K07	realizes the social role of technical university graduates and especially understands the need to formulate information and share it with society, e.g. through mass media, in relation to achievements in environmental engineering and other aspects of engineering activity; makes attempts at sharing such information and opinions in an understandable way	K2_K06

