

## 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 296/21/2012-2016 from 21.05.2014

In effect since 1.10.2014

\*delete as applicable

# I. EDUCATIONAL OUTCOMES

## for the field of study *civil engineering* 2nd level studies – general academic profile

### Faculty of Civil Engineering Wroclaw University of Technology

#### 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.<br>After finishing second level studies on the Civil Engineering Faculty a graduate:   | Reference to the education outcomes for the field of technical sciences (T2A_) |
|---|---|--|
| <b>KNOWLEDGE</b>  |   |  |
| 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   |

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

|               | <b>SKILLS</b>  |   |
|---------------|--|---|
| <b>K2_U01</b> | 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                          | <b>T2A_U01, T2A_U02, T2A_U03, T2A_U04, T2A_U06, T2A_U07</b> |
| <b>K2_U02</b> | 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   | <b>T2A_U01, T2A_U02, T2A_U03, T2A_U04, T2A_U06</b>          |
| <b>K2_U03</b> | is able to decide on the direction of his further education and carry out a process of self-education  | <b>T2A_U01, T2A_U05</b>                                     |
| <b>K2_U04</b> | is able to classify simple and complex building structures   | <b>T2_U07, T2A_U17, T2A_U18</b>                             |
| <b>K2_U05</b> | is able to make an evaluation and configuration of all types of loads applied to building structures with their appropriate combinations   | <b>T2A_U10, T2A_U17</b>                                     |
| <b>K2_U06</b> | 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 | <b>T2A_U09, T2A_U17, T2A_U18, T2A_U19</b>                   |
| <b>K2_U07</b> | 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   | <b>T2A_U09, T2A_U10, T2A_U11, T2A_U12, T2A_U15, T2A_U18</b> |
| <b>K2_U08</b> | 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   | <b>T2A_U07, T2A_U08, T2A_U09, T2A_U10, T2A_U12, T2A_U15</b> |
| <b>K2_U09</b> | is able to critically assess the results of numerical analysis of complex engineering structures   | <b>T2A_U08, T2A_U12, T2A_U16, T2A_U18</b>                   |
| <b>K2_U10</b> | is able to design complex foundations for building structures  | <b>T2A_U09, T2A_U10, T2A_U12, T2A_U17, T2A_U18, T2A_U19</b> |

|               |  |   |
|---------------|--|---|
| <b>K2_U11</b> | 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                                      |
| <b>K2_U12</b> | is able to prepare graphic design documentation in a selected graphic software environment   | T2A_U02, T2A_U04, T2A_U07, T2A_U19  |
| <b>K2_U13</b> | 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                                      |
| <b>K2_U14</b> | 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   |
| <b>K2_U15</b> | 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   |
| <b>K2_U16</b> | 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                                      |
| <b>K2_U17</b> | 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 |
|               | <p>achieves results in the SKILL category in one of the following specializations:</p> <ul style="list-style-type: none"> <li>• carried out in English language:</li> </ul> <p>- Civil Engineering (<b>K2S_CEB_U</b>) (appendix 9)</p>             |   |



|               | <b>SOCIAL COMPETENCY</b>   |                         |
|---------------|--|-------------------------|
| <b>K2_K01</b> | 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  | <b>T2A_K01</b>          |
| <b>K2_K02</b> | 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  | <b>T2A_K02</b>          |
| <b>K2_K03</b> | is able to work independently and cooperate in a team on a specific task;<br>is responsible for both the safety of his work and his subjected team's work  | <b>T2A_K03</b>          |
| <b>K2_K04</b> | is aware of the importance of behaving in a professional way and following ethical values;<br>correctly identifies and resolves dilemmas referring to his profession; is able to formulate priorities when executing tasks specified by himself or others  | <b>T2A_K04, T2A_K05</b> |
| <b>K2_K05</b> | is able to think and act in an entrepreneurial manner  | <b>T2A_K06</b>          |
| <b>K2_K06</b> | 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 | <b>T2A_K07</b>          |

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

| Symbol of education outcomes for the specialization<br>CEB<br>(K2S_CEB_) | Description of specialization education outcomes for the general academic profile.<br>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_) |
|--|--|--|
| <b>KNOWLEDGE</b>   |  |  |
| 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   |
| <b>SKILLS</b>  |  |  |
| 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                           |

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



**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**

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”  |
|--|--|---|
| <b>KNOWLEDGE</b>   |  |   |
| 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   |
| <b>SKILLS</b>  |  |  |
| <b>1) general skills ( not related to the area of engineering education)</b> |  |  |
| 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   |
| <b>2) fundamental engineering skills</b> |  |  |
| 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   |
| <b>3) skills directly connected with solving engineering tasks</b> |  |  |
| 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,<br>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,<br>K2_U11, K2_U16, K2_U17,<br>K2S_CEB_U18, K2S_CEB_U19,<br>K2S_CEB_U20, K2S_CEB_U22,<br>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;<br>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,<br>K2_U10, K2_U11, K2_U16, K2_U17,<br>K2S_CEB_U18, K2S_CEB_U19,<br>K2S_CEB_U20, K2S_CEB_U21,<br>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,<br>K2_U16,<br>K2S_CEB_U19, K2S_CEB_U22,<br>K2S_CEB_U23   |
| <b>SOCIAL COMPETENCES</b>  |  |  |
| 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   |

|                |  |               |
|----------------|--|---------------|
| <b>T2A_K04</b> | is able to set clear priorities leading to the realization tasks set by himself or others  | <b>K2_K04</b> |
| <b>T2A_K05</b> | identifies correctly and solves dilemmas connected with the profession   | <b>K2_K04</b> |
| <b>T2A_K06</b> | is able to think and act in an entrepreneurial way   | <b>K2_K06</b> |
| <b>T2A_K07</b> | 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 | <b>K2_K06</b> |

