STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Pavement structures**		Code **1010101171010124280**
Field of study **Civil Engineering First-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **4 / 7**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **elective**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**	

No. of hours				No. of credits **3**
Lecture: **30**	Classes: **-**	Laboratory: **-**	Project/seminars: **-**	

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art **technical sciences** 　　　　**Technical sciences**	ECTS distribution (number and %**)** **3　100%** 　　　**3　100%**

Responsible for subject / lecturer:

dr inż. Andrzej Pożarycki
email: andrzej.pozarycki@put.poznan.pl
tel. +48 616475817
Faculty of Civil and Environmental Engineering
ul. Piotrowo 5 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	He has knowledge of mathematics, physics and chemistry building, geometry, technical drawing. He knows basic operation of CAD, and basic cartographic mapping, general mechanics, strength of materials, soil mechanics, modeling materials and general principles of shaping the pavements structures. Understands the basics of migration of heat and moisture in pavement layers..
2	**Skills**	Operation computer workstation. He knows how to use literature, and online databases. He knows the basic principles of pavement calculations. He is able to perform simple laboratory experiments to get awareness of the techniques of obtaining parameters for numerical models. Knows English at a level of at least A1.
3	**Social competencies**	Alone complements and extends knowledge in the field of modern processes and technologies. He is aware of the need to raise professional and personal competences. He is with the rules of ethics and respect for the Polish language.

Assumptions and objectives of the course:

- Teaching the students a basic knowledge of the pavement mechanics in the form needed to solve typical tasks of construction, technology, maintenance and management of pavements of various purposes.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Knows the principles of design and analysis of pavement structures of varying purposes (roadways, maneuvering squares, terminals, airport boards) - [K_W09]

2. He knows the selected computer programs to support the calculation and design of pavement structures - [K_W11]

3. He knows the basics of migration of heat and moisture through pavement courses - [K_W13]

4. Is knowledgeable about creating procedures for managing pavements. He knows the norms used in roads and airfields construction - [K_W15]

Skills:

1. Can evaluate and make a statement of loads acting on the pavements of various purposes - [K_U02]

2. He is able to correctly define computational models of computer analysis of pavement structures - [K_U03]

3. Able to correctly select computational tools to solve problems of analysis and design of multilayer pavement structures - [K_U05]

4. He can draw a simple cost estimate of the construction and repairing the roads - [K_U15]

Social competencies:

1. He is responsible for the accuracy of the results of his work and its interpretation - [K_K02]

2. Alone complements and extends knowledge in the field of modern processes and technologies - [K_K03]

3. Understands the need to inform the public knowledge about road construction - [K_K08]

Assessment methods of study outcomes

Knowledge is transmitted in the form of multimedia presentations and direct contacts with the students during the presentation of selected computer applications under GNU GPL, during the classes once a week for 3 hours.

Grading scale:

91 and more:	very good (A)
81-90:	good plus (B)
71-80:	good (C)
61-70:	satisfactory plus (D)
51-60:	satisfactory (E)
50 and less:	failed (F)

Course description

Introduction to the pavements analysis of different purposes: roadways, maneuvering squares, loading terminals, airports, floor (Law basics, classification, technical conditions, diagnostics)

Definition, classification and loadings of pavements: mechanical, temperature, humidity

Determination of parameters for numerical models of pavements: laboratory methods and testing of in-situ

GPR studies and their interpretation

Physics of the pavement's layers and the definition of aggressive environments

Life Cycle Cost Analysis

Items of estimating the costs of pavements construction

3D pavement modeling

Building Failures (introduction to the understanding of the need to know the genesis of pavement defects)

Engineering Programs under the GNU GPL (introduction to pavement diagnostics)

Pavement mechanics (the elements of prognosis)

Modeling the pavement subgrade

Modeling the flexible pavements

The chosen aspects of semi-rigid pavements

Modeling the rigid pavements without the reinforcement

Reinforced rigid pavements

Industrial flooring

Basic bibliography:

1. Firlej S., The pavement mechanics, Petit s.c. Lublin, 2007

2. Nagórski R., Machanics of pavements, PWN, 2014

3. Huang Y, Pavement analysis and design, 2004

Additional bibliography:

1. Nita P., Construction and maintance of airport pavements, WKŁ 1999

2. Maro L., Geosynthetics for subgrade reinforcing, Lemar 2010

3. Szydło A., Pavements of cement concrete, Polish Cement, Kraków 2004

4. Hajduk P., Industrial flooring design, PWN 2014

Result of average student's workload

Activity	Time (working hours)
1. Listening to lectures	30
2. Participation in consultations	5
3. Working alone with the selected software discussed during the lectures	15
4. Preparing for the test	49
5. Writing the test	1

Student's workload

Source of workload	hours	ECTS

Total workload	100	3
Contact hours	20	2
Practical activities	11	1