

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Road materials technology</b>		Code <b>1010104151010123638</b>
Field of study <b>Civil Engineering First-cycle Studies</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 5</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>10</b> Classes: <b>-</b> Laboratory: <b>10</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>100 2%</b> <b>100 2%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Marcin Bilski email: marcin.bilski@put.poznan.pl tel. 61 665 34 85 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
<b>1</b>	<b>Knowledge</b>	K_W01 The student has knowledge of mathematics, physics and chemistry needed to formulate and solve problems related to construction K_W12 The student knows the rules of industrial materials and building components K_W14 The student is familiar with the most commonly used building materials, their properties, production technologies and test methods
<b>2</b>	<b>Skills</b>	K_U13 The student is able to perform simple laboratory experiments leading to the evaluation of the quality of construction materials K_U17 The student makes use of information technology, Internet resources and other sources of information K-U20 The student knows the methods of production and application building materials and makes the selection of them
<b>3</b>	<b>Social competencies</b>	K_K01 The student is able to work independently and collaborate as a team on the specified task K_K06 The student is aware of the need to raise their professional and personal competences K_K10 The student acts in accordance with ethical
<b>Assumptions and objectives of the course:</b> Familiarize of students with the basic materials used in road construction, production and paving technology and the test methods.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. The student knows the national standards and EN standards in terms of materials used in road construction - [K_W06] 2. The student knows asphalt paving technologies HMA, CMA and WMA (hot, cold and warm mixed asphalt) - [K_W12] 3. The student knows the most commonly used road materials and their properties, production technologies and test methods - [K_W14]		
<b>Skills:</b>		
1. The student knows how to design pavement structures using catalogs - [K_U08] 2. The student is able to design a strengthening of the ground under the road pavement - [K_U09] 3. The student is able to perform laboratory tests of bitumens, fillers, mineral aggregates and asphalt - [K_U13] 4. The student knows the methods of production and application building materials and makes the selection of them depending on the technology of construction the road pavement - [K_U20]		

**Social competencies:**

1. The student is able to work independently and collaborate in a team on the given assignment - [K\_K01]
2. Responsibility for the accuracy of the results of their work and their interpretation - [K\_K02]
3. Independence in broadening the knowledge of modern research techniques, processes and technologies - [K\_K03]
4. Responsibility for the safety of self and team - [K\_K05]

**Assessment methods of study outcomes**

Student knowledge is assessed through a written test, carried out in the last lecture of the semester.

Grading Scale:

Percentage of points scored ; rating

91 to 100 ; very good (A)

81 to 90 ; good plus (B)

71 to 80 ; good (C)

61 to 70 ; sufficient plus (D)

51 to 60 ; sufficient (E)

50 or less unsatisfactory (F)

Students' skills are also tested by assessing individually prepared reports concerning performed laboratory exercises

**Course description**

Lectures:

Stone products in road construction

Prefabricated concrete elements in road construction

Classification of the road pavement structure

Principles of designing pavement structure according to Polish catalogues

Materials used in base courses

Bituminous mixtures for road pavements

Road bitumens

Asphalt emulsions

Cement concrete for road surface

Geosynthetics used in road construction

Laboratory exercises:

Laboratory tests of basic properties of asphalt binders: penetration and softening point

Determination of elastic recovery of polymer modified bitumens

Tests of mineral fillers used in asphalt mixtures

The study of geometrical characteristics and physical properties of aggregates used in asphalt mixtures

Determination of the stability and flow of asphalt concrete

Determination of compaction index and void content in asphalt pavement layers

**Basic bibliography:**

1. Piłat J., Radziszewski P., Król J., Technologia materiałów i nawierzchni asfaltowych, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2015
2. Piłat J., Radziszewski P., Nawierzchnie asfaltowe, WKŁ, Warszawa 2010
3. Gaweł I., Kalabińska M., Piłat J., Asfalty drogowe, WKŁ, Warszawa 2014
4. Stefańczyk B., Mieczkowski P., Mieszanki mineralno-asfaltowe. Wykonawstwo i badania, WKŁ, Warszawa 2008
5. Szydło A., Nawierzchnie z betonu cementowego. Teoria, wymiarowanie, realizacja, Polski Cement, Kraków 2004
6. Stefańczyk B. (red.), Budownictwo ogólne. Tom 1. Materiały i wyroby budowlane, Arkady, Warszawa 2009
7. Bugajski M., Grabowski W., Geosyntetyki w budownictwie drogowym, Wydawnictwo Politechniki Poznańskiej, Poznań 1999

**Additional bibliography:**

1. Stefańczyk B., Mieczkowski P., Dodatki, katalizatory i emulgatory w mieszankach mineralno-asfaltowych, WKŁ, Warszawa 2010
2. Błażejowski K., Styk S., Technologia warstw asfaltowych, WKŁ, Warszawa 2009
3. Arendarski J., Niepewność pomiarów, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003
4. Wymagania Techniczne WT-1 2014, Kruszywa do mieszanek mineralno-asfaltowych i powierzchniowych utwaleń na drogach krajowych, GDDKiA Warszawa 2014
5. Wymagania Techniczne WT-2 2014 część I, Nawierzchnie asfaltowe na drogach krajowych - Mieszanki mineralno-asfaltowe, GDDKiA Warszawa 2014
6. Wymagania Techniczne WT-2 2016 część II, Nawierzchnie asfaltowe na drogach krajowych - Wykonanie warstw nawierzchni asfaltowych, GDDKiA Warszawa 2016
7. Wymagania Techniczne WT-4 2010, Mieszanki niezwiązane do dróg krajowych, GDDKiA Warszawa 2010
8. Wymagania Techniczne WT-5 2010, Mieszanki związane spoiwem hydraulicznym do dróg krajowych, GDDKiA Warszawa 2010
9. Rozporządzenie Ministra Transportu i Gospodarki Morskiej w sprawie warunków technicznych, jakim powinny odpowiadać drogi publiczne i ich usytuowanie, Dz.U. 2016 poz. 124

**Result of average student's workload**

Activity	Time (working hours)	
1. Preparation for laboratory exercises	5	
2. Preparing laboratory exercises reports	10	
3. Execution of laboratory exercises	15	
4. Mastering knowledge of the implemented Course, including participation in lectures	30	
Student's workload		
Source of workload	hours	ECTS
Total workload	60	2
Contact hours	20	1
Practical activities	30	1