



COURSE SPECIFICATION

Course code	B2-1-BD-206
Course title in Polish	Konstrukcje nawierzchni drogowych
Course title in English	Pavement Structures
Valid from academic year	2019/2020

CURRICULAR ALIGNMENT

Programme	CIVIL ENGINEERING
Level	second-cycle
Programme profile	academic
Mode of attendance	full-time
Specialism	Highway Engineering
Academic unit responsible for the course	Department of Transport Engineering
Course coordinator	dr inż. Przemysław Buczyński
Approved by	prof. dr hab. inż. Marek Iwański

COURSE DESCRIPTION

Teaching block	specialism
Course status	required
Language of instruction	Polish
Semester of delivery	semester I
Prerequisites	-
Exam (YES/NO)	NO
ECTS	3

Mode of teaching	lecture	class	lab	project	seminar
Number of hours per semester	30			30	

LEARNING OUTCOMES

Category	Code	Learning outcomes	Corresponding programme outcome code
Knowledge	W01	Students are familiar with currently used construction materials, their manufacturing technologies and construction technologies related to road construction.	B2_W07

	W02	Students have basic knowledge of the strength issues regarding materials, structures and buildings.	B2_W03
	W03	Students are familiar with standards and design guidelines for road structures and their components.	B2_W14
Skills	U01	Students know how to select the right material for each layer of a pavement structure.	B2_U13
	U02	Students can design a road pavement structure for KR1-KR7 traffic categories, including traffic load assessment.	B2_U01
	U03	Students can perform stress and strain analysis of typical cases of pavement structures and adapt them to actual field conditions. Students know the back calculation method.	B2_U17
Competence	K01	Students can work independently.	B2_K01
	K02	Students are aware of and responsible for the reliability of the obtained test results.	B2_K02
	K03	Students can formulate conclusions and describe the results of tests carried out.	B2_K04

COURSE CONTENT

Teaching mode*	Topics covered
lecture	<p>1 Basic definitions, names, and terms. Classification of road pavements. Factors that destruct pavement structure.</p> <p>2. Conventional design methods for flexible pavements - PJ-IBD, OSZD and CBR methods.</p> <p>3. Design traffic loading and traffic category determination.</p> <p>4. Catalogue of typical flexible, semi-rigid and rigid structures. Structural design procedures according to the Catalogue.</p> <p>5. Strengthening pavement structures using the elastic deflection method.</p> <p>6. Material constants used to describe the arrangement of structural layers - testing methods.</p> <p>7. Fatigue life of road pavement structures. Mechanistic method - Design procedures for flexible pavements.</p> <p>8. Use of stiffness modulus leading curve models in the design of flexible pavement structures.</p> <p>9. Stress distribution in flexible pavement and durability of recycled base course.</p> <p>10. Elements of pavement diagnostics. Back-calculation method for pavement stiffness modulus estimation.</p> <p>11. Rigid pavements. Design of rigid pavements.</p>
project	<p>1. Calculation of the traffic category for the analysed road section using traffic archive data.</p> <p>2. Subgrade reinforcement design in embankment, calculation of lower pavement layers, design of upper structural layers according to the Catalogue of Typical Flexible and Semi-rigid Pavements; checking the frost resistance condition of the subgrade.</p> <p>3. Flexible pavement reinforcement design using the deflection method.</p> <p>4. Pavement structural reinforcement using the mechanistic method.</p> <p>5. Pavement structure design using the mechanistic method.</p> <p>6. Design of a rigid cement concrete pavement.</p>

METHODS OF LEARNING OUTCOMES VERIFICATION

Learning outcome	Learning outcome verification methods					
	Oral exam	Written exam	Test	Project	Report	Other
W01			X	X		
W02			X	X		
W03			X	X		
U01			X	X		
U02			X	X		
U03			X	X		
K01				X		
K02				X		
K03				X		

ASSESSMENT

Teaching mode*	Assessment type	Criteria
lecture	exam	Scoring at least 50% on the in-class test.
project	mark-based	A passing grade or higher on each project.

STUDENT WORKLOAD

ECTS weighting							
	Activities	Student workload					Unit
		W	C	L	P	S	h
1.	Scheduled contact hours	30			30		
2.	Other (office hours, exams)	2			2		h
3.	Total number of contact hours	64					h
4.	Number of ECTS credits for contact hours	2,56					ECTS
5.	Independent study hours	11					h
6.	Number of ECTS credits for independent study	0,44					ECTS
7.	Practical hours	35					h
8.	Number of ECTS credits for practical hours	1,4					ECTS
9.	Total workload	75					h
10.	ECTS credits for the course <i>1 ECTS credit =25 student learning hours</i>	3					ECTS

READING LIST

1. Lewinowski Cz., *Wymiarowanie podatnych nawierzchni drogowych*. PWN. W-wa, 1980.
2. Lewinowski Cz., *Wymiarowanie konstrukcji jezdni drogowych z betonu cementowego*. PWN. W-wa, 1982.

3. Grzybowska W., Smukalski K. *Nawierzchnie drogowe*. Wyd. Politechniki Krakowskiej, Kraków, 1983.
4. Szydło A. *Nawierzchnie drogowe z betonu cementowego*. Polski Cement. Kraków, 2004.
5. Rolla S. *Badania materiałów i nawierzchni drogowych*. WKiŁ, W-wa, 1979.
6. Tylman E. *Technologia materiałów drogowych*. WKiŁ, W-wa, 1987.
7. Piłat J., Radziszewski P., *Nawierzchnie asfaltowe*, WKŁ, Warszawa 2010.
8. Gawel I., Kalabińska M., Piłat J., *Asfalty drogowe*. WKŁ, Warszawa 2014.
9. Kalabińska M., Piłat J., *Reologia asfaltów i mas mineralno-asfaltowych*. WKŁ, Warszawa 1982.
10. Stefańczyk B., Mieczkowski P., *Mieszanki mineralno-asfaltowe. Wykonawstwo i badania*. WKŁ, Warszawa 2008,
11. Nita P., *Budowa i utrzymanie nawierzchni lotniskowych*. WKŁ, Warszawa 2008.
12. Błażejowski K., Styk S., *Technologia warstw asfaltowych*. WKŁ, Warszawa 2009.
13. Kalabińska M, Piłat J. *Technologia materiałów i nawierzchni drogowych*. PWN, W-wa, 1985.
14. Edel R., *Odwodnienie dróg*. WKŁ, Warszawa 2002.
15. Błażejowski K., *SMA. Teoria i praktyka*. JRS, Warszawa 2007.
16. Głażewski M., Nowocień E., Piechowicz K., *Roboty ziemne i rekultywacja w budownictwie komunikacyjnym*. WKŁ, Warszawa 2010.
17. Wiłun Z., *Zarys geotechniki*. WKiŁ, Warszawa 2013.
18. Judycki J., *Analiza i projektowanie konstrukcji nawierzchni podatnych i półsztywnych*. WKŁ, Warszawa 2014.
19. Bzówka J., Knapik K., Juzwa A., Stelmach K., *Geotechnika drogowa*. Wydawnictwo Politechniki Śląskiej, Gliwice 2013.
20. Katalog Typowych Konstrukcji Podatnych i Półsztywnych, GDDKiA, Warszawa 2014.
21. Czasopisma fachowe: Drogownictwo, Drogi i Mosty.
Normy przedmiotowe