

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Modern Technologies in Road Engineering		Code 1010102111010121020
Field of study Civil Engineering Second-cycle Studies	Profile of study (general academic, practical) general academic	Year /Semester 1 / 1
Elective path/specialty Roads and Airfields	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: 2 Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: prof. dr hab. inż. Wojciech Grabowski email: wojciech.grabowski@put.poznan.pl tel. 61-665-24-87 Civil and Environmental Engineering Piotrowo street, 5. Poznań.		Responsible for subject / lecturer: dr inż. Mieczysław Słowik email: mieczyslaw.slowik@put.poznan.pl tel. 61-665-24-87 Civil and Environmental Engineering Piotrowo street, 5. Poznań.
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	The student has knowledge of areas: mathematics, physics, chemistry, construction materials, useful for solving problems related to road construction. The student knows the rules of the design and construction of road objects. K_W10. The student has a basic knowledge of the design of road infrastructure objects.
2	Skills	The student is able to classify the elements of road construction objects. The student knows how to dimension the basic elements of road construction objects.
3	Social competencies	The student can work independently. The student is aware of the need to improve his skills. The student follows the rules of ethics.
Assumptions and objectives of the course: 1) The acquisition of knowledge in the application of modern technology in the road engineering. 2) Ability to identify and solve important problems of technology, in particular environment-friendly solutions. 3) The acquisition of skills necessary to learn new issues and trends in technology development road.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. The student knows the materials and construction products and technologies used in road engineering - [K_W07] 2. The student knows the methods to assess the impact of technology on the environment. - [K_W13] 3. The student knows the standards for materials and products used in road construction and pavement structure design conditions - [K_W14]		
Skills: 1. The student is able to assess the impact of road technology on the environment - [K_U08] 2. The student is able to plan and carry out laboratory experiments leading to the evaluation of the quality of road materials - [K_U11] 3. The student is able to carry out preliminary work on a research to resolve technological problems in road engineering - [K_U17]		
Social competencies:		

- | |
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| 1. The student can work independently. - [K_K01]
2. The student is aware of the need to improve his skills - [K_K06]
3. The student follows the rules of ethics - [K_K11] |
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Assessment methods of study outcomes

Student's knowledge is assessed on the basis of a written pass.
 Student's skills are evaluated on the basis of the reports of laboratory projects.

Course description

The development of technology and road pavement structures and the environment.
 Porous, drainage and retention pavements - advantages and disadvantages.
 Recycling of bituminous pavements. Evaluation of different technologies.
 Recycling of concrete pavements. Asphalt pavement maintenance technologies.
 Concrete pavement maintenance technologies. The "cold" and "hot" thin bituminous layers.
 Methods of tests and assessments of the executed works from the point of view of the surface properties of the pavement, resistance to rutting and fatigue.

Basic bibliography:

- Piłat J., Radziszewski P., Nawierzchnie asfaltowe, WKŁ 2004.
- Szydło A., Nawierzchnie drogowe z betonu cementowego, Polski Cement 2004.

Additional bibliography:

- The Shell Bitumen Handbook, Shell Bitumen U.K. 1991.
- Gaweł I., Kalabińska M., Piłat J., Asfalty drogowe, WKŁ 2001.
- Bugajski M., Grabowski W., Geosyntetyki w budownictwie drogowym, Wydawnictwo Politechniki Poznańskiej 1999.
- Tsohos G., H., Highway Environmental Engineering, University Studio Press, Thessaloniki 2001.
- Stefańczyk B., Mieczkowski P., Mieszanki mineralno-asfaltowe, wykonawstwo i badania, WKŁ 2008.
- Prace zbiorowe pod redakcją Grabowski W., Nowoczesne technologie w budownictwie drogowym, Poznań, 2001, 2005, 2009.

Result of average student's workload

Activity	Time (working hours)	
1. Preparing to pass, preparing for laboratories	112	
Student's workload		
Source of workload	hours	ECTS
Total workload	112	4
Contact hours	60	2
Practical activities	30	1