STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Dynamics of Bridges**		Code **1010102131010120363**
Field of study **Civil Engineering Second-cycle Studies**	Profile of study (general academic, practical) **(brak)**	Year /Semester **2 / 3**
Elective path/specialty **Bridges and Underground Engineering**	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: **1** Classes: **1** Laboratory: **-** Project/seminars: **-**		No. of credits **3**
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		ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	The student knows the basics of building dynamics presented in the context of the subject Dynamics Bridges. (Year/Semester: 1/2)
2	**Skills**	The student can individually access to the technical knowledge from any source; has a predisposition to continuing self-education.
3	**Social competencies**	The student understands the essence of the profession of civil engineer, also in terms of social and legal responsibility.

Assumptions and objectives of the course:

Getting to know the types of dynamic load, the load-structure interaction, modeling impacts of high-speed railway rolling stock, pedestrians and wind. Acquiring the ability to carry out dynamic analysis of simple bridge structures.

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

Knowledge:

1. The student knows the types of interactions of dynamic live loads of bridges, their characteristics and methods of modeling. - [K_W01]
2. The student knows the basics of modal analysis of the structure. - [K_W02, K_W03, K_W04]
3. The student knows the rules and equipment for the dynamic testing of bridges and knows the ways of reducing (damping) vibration of simple construction. - [K_W03]

Skills:

1. The student is able to apply models of variable loads (specified by standards and literature) to the dynamic analysis of bar structures. - [K_U01, K_U02]
2. Student is able to perform dynamic analysis of a simple bar structures 2 and 3-D in order to determine the basic modal parameters. - [K_U04, K_U06, K_U07]
3. Student is able to redesign the structure in order to reduce excessive vibration. - [K_U03]

Social competencies:

1. The student can own or as part a team to work effectively in carrying out simple modal analysis of engineering structures. - [K_K01]
2. The student is aware of the need for constant self-education in order to improve their skills and increase knowledge related to technological progress in the field of bridge and building construction. - [K_K03, K_K06]
3. Student is able to critically evaluate the results of the analyzes and calculations design and dimensioning of bridges (for projects under tutorials). - [K_K02]

Assessment methods of study outcomes
1. Project execution entitled 'Dynamic analysis of the construction of a footbridge' (Class auditorium) - submission before the end of the semester
2. Written test at the end of a series of lectures in the second half of semester (Lecture)

Course description
1.Influence of wind on the design of a bridge structure
2.The impact of road and rail rolling stock
3.Pedestrian impact
4.Identification of the dynamic parameters of a bridge structure
5.Modal analysis as a tool to identify structures
6.Interpretation of experimental results and load test
7.Equipment for testing and measurements

Basic bibliography:

1. A. Flaga, Inżynieria wiatrowa. Podstawy i zastosowania, Arkady, Warszawa, 2008
2. A. Flaga, Mosty dla pieszych, WKŁ, Warszawa, 2011
3. M. Klasztorny, Dynamika mostów belkowych obciążonych pociągami szybkobieżnymi, Wydawnictwo Naukowo-Techniczne, Warszawa, 2005
4. Stahlbau Kalender 2008, praca zbiorowa, Ernst & Sohn, Berlin, 2008
5. J. Biliszczuk, Mosty podwieszone, projektowanie i realizacja, Arkady, Warszawa, 2005
6. J. Biliszczuk (praca zbiorowa), Projektowanie stalowych kładek dla pieszych, Dolnośląskie Wydawnictwo Edukacyjne, Wrocław, 2007

Additional bibliography:

1. R. Ciesielski, E. Maciąg, Drgania drogowe i ich wpływ na budynki, WKŁ, Warszawa, 1990
2. R. Lewandowski, Dynamika konstrukcji budowlanych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2006
3. T. Chmielewski, Z. Zembaty, Podstawy dynamiki budowli, Arkady, W-wa 1998
4. Kładki dla pieszych: architektura, projektowanie, realizacja, badania, materiały seminaryjne, dWe, Wrocław 2007

Result of average student's workload

Activity	**Time (working hours)**
1. Participation in lectures	30
2. The reading of selected monographs and technical press - including in English or German.	15
3. Preparing to pass the lectures.	15
4. Preparation and implementation of the exercise.	30

Student's workload

Source of workload	**hours**	**ECTS**
Total workload	90	3
Contact hours	30	2
Practical activities	20	1