



## Subject card

|   |  |  |  |                                     |  |            |     |
|---|--|--|--|-------------------------------------|--|------------|-----|
| Subject name and code                       | Experimental Methods in Strength of Materials, PG_00044005   |  |  |                                     |  |            |     |
| Field of study                              | Civil Engineering  |  |  |                                     |  |            |     |
| Date of commencement of studies             | October 2021   |  | Academic year of realisation of subject  |                                     | 2022/2023  |            |     |
| Education level                             | first-cycle studies  |  | Subject group  |                                     | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |            |     |
| Mode of study                               | Full-time studies  |  | Mode of delivery   |                                     | at the university  |            |     |
| Year of study                               | 2  |  | Language of instruction  |                                     | Polish   |            |     |
| Semester of study                           | 3  |  | ECTS credits   |                                     | 1.0  |            |     |
| Learning profile                            | general academic profile   |  | Assessment form  |                                     | assessment   |            |     |
| Conducting unit                             | Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering   |  |  |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor   |  | prof. dr hab. inż. Magdalena Rucka   |                                     |  |            |     |
|   | Teachers   |  | dr inż. Erwin Wojtczak<br><br>dr inż. Aleksandra Kuryłowicz-Cudowska<br><br>mgr inż. Błażej Meronk<br><br>dr inż. Łukasz Pachocki  |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type  | Lecture  | Tutorial   | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours  | 0.0  | 0.0  | 15.0                                | 0.0  | 0.0        | 15  |
|   | E-learning hours included: 0.0   |  |  |                                     |  |            |     |
| Learning activity and number of study hours | Learning activity  | Participation in didactic classes included in study plan |  | Participation in consultation hours |  | Self-study | SUM |
|   | Number of study hours  | 15   |  | 2.0                                 |  | 8.0        | 25  |
| Subject objectives                          | The purpose of the laboratory is an experimental verification of formulas of strength of materials using model tests.  |  |  |                                     |  |            |     |
| Learning outcomes                           | Course outcome   |  | Subject outcome  |                                     | Method of verification   |            |     |
|   | [K6_U03] can analyze simple rod constructions in scope of: calculations of constructions statically determined and undetermined; determining of modal frequencies; calculations of linear stability and bearing capacity in critical and boundary states |  | Student solves simple beams, frames and trusses.   |                                     |  |            |     |
|   | [K6_W04] has knowledge of general mechanics, strength of materials and general rules of construction   |  | Student defines differences between the experimental and analytical results and their reasons. Student estimates the application range of the theoretical equations of mechanics of materials. |                                     |  |            |     |

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| Subject contents   | The following experiments are individually carried out and analysed:<br><br>- tension and compression tests for carbon and hardened steel specimens<br><br>- bend tests for steel and aluminium beams having various sections: rectangular, T and channel<br><br>- determination of Young modulus and Poisson's ratios for polycarbonate specimens (using strain gauges)<br><br>- determination of strains in selected sections for bending polycarbonate beams (T and Z sections)<br><br>- torsion angle for thin-walled tubes having closed and open cross sections<br><br>- determination of the centre of twist for two thin-walled beams<br><br>- measurement of beam displacements<br><br>- determination of critical loads for various supported columns<br><br>- determination of the shape of a cable |   |                               |
| Prerequisites and co-requisites                                | Course Engineering Mechanics should be completed. Course Strength of Materials should be taken. Precondition to the executing of experiments is acquaintance with the Ref. [1].  |   |                               |
| Assessment methods and criteria                                | Subject passing criteria   | Passing threshold   | Percentage of the final grade |
|  | Test   | 60.0%   | 50.0%                         |
|  | Reports  | 60.0%   | 50.0%                         |
| Recommended reading  | Basic literature   | <ol style="list-style-type: none"><li>1. Chróścielewski J., Rucka M., Witkowski W.: <i>Metody doświadczalne w wytrzymałości materiałów</i>. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2018.</li><li>2. Banasiak M.: <i>Ćwiczenia laboratoryjne z wytrzymałości materiałów</i>. PWN, Warszawa, 2000.</li><li>3. Bielewicz E.: <i>Wytrzymałość materiałów</i>, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2006.</li><li>4. Boruszak A., Sygulski R., Wrześniowski K.: <i>Wytrzymałość materiałów: doświadczalne metody badań</i>. PWN Warszawa-Poznań, 1984.</li><li>5. Burczyński T., Beluch W., John A.: <i>Laboratorium z wytrzymałości materiałów</i>. Wydawnictwo Politechniki Śląskiej, Gliwice, 2002.</li><li>6. Górski J., Iwicki P., Mikulski T.: <i>Metody doświadczalne w analizie konstrukcji</i>. Skrypt Politechniki Gdańskiej, Gdańsk, 2008.</li></ol> |                               |
|  | Supplementary literature   | <ol style="list-style-type: none"><li>1. Dyląg Z., Jakubowicz A., Orłowski Z.: <i>Wytrzymałość materiałów</i>, tom I, Wydawnictwa Naukowo-Techniczne, 2003.</li><li>2. Dyląg Z., Jakubowicz A., Orłowski Z.: <i>Wytrzymałość materiałów</i>, tom II, Wydawnictwa Naukowo-Techniczne, 2003.</li><li>3. Szymczak Cz., Skowronek M., Witkowski W., Kujawa M.: <i>Wytrzymałość materiałów. Zadania</i>. PG, Gdańsk 2002, 2009.</li></ol>  |                               |
|  | eResources addresses   | Adresy na platformie eNauczanie:  |                               |
| Example issues/<br>example questions/<br>tasks being completed | <ul style="list-style-type: none"><li>• Analyse and interpret the obtained experimental results. Compare the results of experiments with theoretical calculations.</li><li>• Perform experimental tests according to the instructions in groups of three.</li><li>• Draw stress diagrams for torsion of an open and closed annular bar.</li><li>• Draw a graph of tensile test for mild and hard steel.</li></ul>  |   |                               |
| Work placement   | Not applicable   |   |                               |