GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

| | | | |
|---|---|---|---|
| Subject name and code | Strength of Materials I, PG_00055150 | | |
| Field of study | Mechanical Engineering | | |
| Date of commencement of studies | October 2025 | Academic year of realisation of subject | 2026/2027 |
| 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 | English |
| Semester of study | 3 | ECTS credits | 5.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Department Of Mechanics And Mechatronics -> Faculty Of Mechanical Engineering And Ship Technology -> Wydziały Politechniki Gdańskiej | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Wiktoria Wojnicz | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 30.0 | 0.0 | 0.0 | 0.0 | 60 |

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 | 60 | 8.0 | 57.0 | 125 |

**Subject objectives**

The aim of the subject is to present the fundamentals of strength of materials and methods used to conduct strength of materials calculations

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| K6_U01 | A student can use methods strength of materials methods to solve engineering problems | [SU2] Assessment of ability to analyse information<br>[SU5] Assessment of ability to present the results of task<br>[SU1] Assessment of task fulfilment<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools |
| K6_U06 | The student can analysis a behaviour of mechanical systems | [SU1] Assessment of task fulfilment<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools<br>[SU2] Assessment of ability to analyse information<br>[SU5] Assessment of ability to present the results of task |
| K6_W05 | The student can design the simple mechanical systems and conduct mechanical analysis of these systems | [SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge<br>[SW3] Assessment of knowledge contained in written work and projects |

| | |
|---|---|
| Subject contents | **Lectures**<br><br>1. Fundamentals of Strength of Materials. Area moments of inertia.<br><br>2. Axial load: statically determinate problems of bars and systems of bars.<br><br>3. Axial load: statically indeterminate problems of bars and systems of bars. Thermal stress and mounting stress.<br><br>4. Torsion load: statically determinate problems of shafts, driving shafts, statically indeterminate problems shafts.<br><br>5. Bending of beams: determination of shear forces and bending moments.<br><br>6. Deflection of beam (method of initial parameters (Clebsch's method)). Statically determinate problems and statically indeterminate problems.<br><br>7. Determination of internal forces in planar frames.<br><br>8. Determination of geometrical parameters of axial loaded bars (systems of bars), torsion loaded shafts driving shafts and bending beams (normal and shear stresses).<br><br>9. Planar state of stress. Mohr's circle of planar state of stress.<br><br>10. Energy theorems for statically determinate problems (beams, frames, system of bars). Castigliano's theorem.<br><br>11. Energy theorems for statically determinate problems (beams, frames, system of bars). Maxwella-Mohr's method.<br><br>12. Energy theorems for statically indeterminate problems (beams, frames). Menabrea-Castigliano's method.<br><br>13. Complex loading problems.<br><br>**Tutorials**<br><br>1. Area moments of inertia.<br><br>2. Axial load: statically determinate problems of bars and systems of bars. Axial load: statically indeterminate problems of bars and systems of bars.<br><br>3. Torsion load: statically determinate problems of shafts and statically indeterminate problems of shafts.<br><br>4. Bending of beams: determination of shear forces and bending moments.<br><br>5. Deflection of beam (method of initial parameters (Clebsch's method). Statically determinate problems and statically indeterminate problems.<br><br>6. Determination of geometrical parameters of axial loaded bars (systems of bars), torsion loaded shafts and driving shafts, beams (normal and shear stresses). |

<table>
<tr><td></td><td>7. Planar state of stress. Mohr’s circle of planar state of stress.<br><br>8. Energy theorems for statically determinate problems (beams, frames, system of bars). Castigliano’s theorem.<br><br>9. Energy theorems for statically determinate problems (beams, frames, system of bars). Maxwella-Mohr’s method.<br><br>10. Energy theorems for statically indeterminate problems (beams, frames, system of bars). Menabrea-Castigliano’s method.<br><br>12. Test 1<br><br>13. Test 2<br><br>13. Repeat test</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge form the Mechanics (Theoretical Mechanics) field</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>lectures' test passing</td><td>56.0%</td><td>50.0%</td></tr><tr><td>tutorials' tests passing</td><td>56.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. Muvdi B.B., McNabb J.W.: Engineering Mechanics of Materials. Third edition. Springer-Verlag 1991.<br>2. Da Silva, Vitor Dias: Mechanics and Strength of Materials. Springer 2006.<br>3. Timoshenko S.: Strength of Materials. Part I. Elementary Theory and Problems. USA 1940.<br>4. Timoshenko S.: Strength of Materials. Part II. Advanced Theory and Problems. USA 1940.</td></tr><tr><td>Supplementary literature</td><td>Literature from the "Strength of Materials" field</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1.Analysis a behaviour of the given mechanical system<br><br>2. Determine internal forces in the beam constrained and subjected to the application of one concentrated force and load with linear intensity distribution</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.