1. Course title: Technical mechanics
2. Course code


4. Level of studies: 1st cycle of higher education

5. Mode of studies: intramural studies

6. Field of study: Industrial and Engineering Chemistry

7. Programme: general

8. Faculty unit teaching the course: Department of Chemical Engineering and Process Design

9. Semester: 3

10. Course instructor: prof. Andrzej Gierczycki, PhD, DSc

11. Course classification: field

12. Course status: compulsory

13. Language of instruction: English

15. Pre-requisite qualifications: basic knowledge of Mathematics and Physics

16. Course objectives: An objective of the course is to acquaint students with the fundamental principles describing effects of forces on a rigid solid body, behaviour of an elastic body under the action of various loads and to recognize different machine elements.

17. Description of learning outcomes: underneath

<table>
<thead>
<tr>
<th>No.</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Learning outcomes reference code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>student knows axioms, theorems and rules in statics of material systems</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W02 ++ K1A_W14 +</td>
</tr>
<tr>
<td>2.</td>
<td>student possesses the knowledge of simple cases of stresses in bars and knows the dependencies employed in strength of material</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W02 ++ K1A_W14 +</td>
</tr>
<tr>
<td>3.</td>
<td>student possesses the basic knowledge of machine elements</td>
<td>examination</td>
<td>lecture</td>
<td>K1A_W02 ++ K1A_W14 +</td>
</tr>
<tr>
<td>4.</td>
<td>student is able to carry out simple calculations concerning statics of material systems</td>
<td>credit test</td>
<td>class</td>
<td>K1A_U24 ++</td>
</tr>
<tr>
<td>5.</td>
<td>student is able to carry out simple calculations concerning strength of materials</td>
<td>credit test</td>
<td>class</td>
<td>K1A_U24 ++</td>
</tr>
<tr>
<td>6.</td>
<td>student understands the necessity of further professional training and the development of his/her engineering and personal competence</td>
<td>observation and discussion</td>
<td>lecture, class, consultation</td>
<td>K1A_K01 +</td>
</tr>
</tbody>
</table>

18. Teaching modes and hours

Lecture / BA /MA Seminar / Class / Project / Laboratory

Lecture sem. 3 - 30 h / class – sem. 3 - 15 h

19. Syllabus description:

The course is divided into three parts: statics of material systems, strength of materials and basic machine elements. The first one comprises: the model of rigid body, external, supporting and internal forces, couples, moments, axioms of statics, reduction of the system of forces, equilibrium and non-equilibrium systems of forces and friction phenomenon. In the latter, Coulomb’s experiment, slide, rolling and belt friction are presented. The second one considers: a concept of the elastic body, stress and deformation, principle of solidification and Hooke’s law. Then main mechanical properties of materials and their measurements including tension, compression, hardness and impact strength tests and also
creep and fatigue phenomena are discussed. A basic part of the strength of materials comprises simple cases of stresses such as axial tension, simple bending, torsion and shearing in straight bars. All cases are treated as hyperstatic problems and are solved employing a set of equilibrium equations, geometrical relations and physical relations. The permissive stress method and its usage are also described. Additionally, main methods showing how to deal with compound cases together with a concept of reduced stress and main strength hypothesis are presented. In the third part of this course various types of fastenings, couplings, clutches, slide bearings, rolling bearings, brakes and power transfer systems (gears) are presented. The working principles of machine elements are considered and shown in simple sketches.

20. Examination: no

21. Primary sources:

22. Secondary sources:

23. Total workload required to achieve learning outcomes

<table>
<thead>
<tr>
<th>Lp.</th>
<th>Teaching mode</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>30/-</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>15/15</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>-/-</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>-/-</td>
</tr>
<tr>
<td>5</td>
<td>BA/ MA Seminar</td>
<td>-/-</td>
</tr>
<tr>
<td>6</td>
<td>Other (consultations, credit)</td>
<td>15/15</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>60/30</td>
</tr>
</tbody>
</table>

24. Total hours: 90

25. Number of ECTS credits: 3

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects):-

26. Comments:-

Approved:

.................................
(date, Instructor’s signature).................................
(date, the Director of the Faculty Unit signature)