

POLITEHNICA University of Bucharest (**UPB**)  
 Faculty of Engineering and Management of Technological Systems (**I.M.S.T.**)  
 Study Program: Industrial Engineering (**I.E.**)  
 Form of study: Bachelor

## COURSE SPECIFICATION

|                      |                          |                        |   |
|----------------------|--------------------------|------------------------|---|
| <b>Course title:</b> | Mechanics of Materials 1 | <b>Semester:</b>       | 2 |
| <b>Course code:</b>  | UPB.06.D.02.O.001        | <b>Credits (ECTS):</b> | 6 |

| <b>Course structure</b>             | Lecture | Seminar | Laboratory | Project | Total hours |
|-------------------------------------|---------|---------|------------|---------|-------------|
| <i>Number of hours per week</i>     | 2       | 2       | 2          | 0       | <b>6</b>    |
| <i>Number of hours per semester</i> | 28      | 28      | 28         | 0       | <b>84</b>   |

| <b>Lecturer</b>                  | Lecture  | Seminar / Laboratory / Project  |
|----------------------------------|--|---|
| <i>Name, academic degree</i>     | Gabriel Jiga, Prof. Dr.                                    | Gabriel Jiga/ Ștefan Pastramă   |
| <i>Contact (email, location)</i> | <a href="mailto:gabijiga@yahoo.com">gabijiga@yahoo.com</a> | <a href="mailto:stefan.pastrama@upb.ro">stefan.pastrama@upb.ro</a><br>CA006 |

| <b>Course description:</b>  |
|---|
| <p>Correct understanding of phenomena connected with loading and deformation of mechanical structures; learning of main methodologies specific for mechanics of deformable bodies with focus on calculus of stresses and strains in one dimensional structures (bars) and bi-dimensional structures (tanks, tubes, etc.); use of strength, stiffness and stability criteria for investigations on elastic structures; learning of numerical methods and experimental techniques for determination of stresses and strains in mechanical structures. In the first part the student will be familiarized with main concepts such: stress-strain curve, allowable strength, safety factor, stress concentrators, transverse contraction etc. The simply loadings acting on a one-dimensional element (tension/compression, shear, torsion and bending) will be also presented. For each chapter there will be presented as well statically determinate or indeterminate problems. At the end of the semester the students will know how to determine the stresses and the deformations in a straight bar, in a frame or in a curved bar.</p> |
| <b>Seminar / Laboratory / Project description:</b>  |
| <p>Deepening of theoretical knowledge by learning how to solve different types of problems and by undertaking experimental and numerical laboratory themes. Applications with strong practical character will strengthen theoretical aspects, notions and relationships that form the basics of strength calculations. Learning of experimental methodologies for determination of stress and strain state and computer codes from mechanics of materials. In parallel, a computer code – MDSolids, will be presented to the students and all applications will be performed as well numerically and analytically. Simply loadings – tension, compression, torsion of circular bars, determination of the Young modulus of a mild steel will be performed in the laboratory.</p>  |
| <b>Intended learning outcomes:</b>  |
| <p>Acquirement of basic knowledge from mechanics of deformable bodies, necessary for a correct approach of technical problems and for a general view on problems concerning strength, stiffness</p>   |

and stability of mechanical structures in order to design reliable structures. In the same time, the student will be familiarized with the strength and stability calculus of one-dimensional element, necessary for the course of Machine elements, which will be taught in the second semester of the second year.

| <b>Assessment method:</b> | <b>% of the final grade</b> | <b>Minimal requirements for award of credits</b> |
|---------------------------|-----------------------------|--|
| Written exam              | 40                          | 20%  |
| Report / project          | -                           |  |
| Homework                  | 10                          | 5%   |
| Laboratory                | 10                          | 10%  |
| Other                     | 40                          | 20%  |

**References:**

1. G. Jiga – *Mechanics of Materials I* – Ed. Printech, 2014
2. J. Case, A.H. Chilver, C.T.F. Ross - *Strength of Materials and Structures* – fourth edition, Arnold Publishers, UK, 1999, ISBN 0340719206.
3. Madhukar Vable – *Mechanics of Materials*, Second Edition, Oxford University Press 2008, ISBN 0195188551, 9780195188554
4. D.W.A. Rees - *Mechanics of Solids and Structures*, Imperial College Press, UK, 2000, ISBN 1860942172
5. G. Jiga, Ș.D. Pastramă (coordonatori) – *Teste grilă de Rezistența materialelor* (Strength of materials tests), ISBN 9975-63-241-8, Editura Tehnică INFO Chișinău, Republica Moldova 2004 (in Romanian).

**Prerequisites:**

**Co-requisites**

*(courses to be taken in parallel as a condition for enrolment):*

Mathematics, Mechanics, Physics

**Additional relevant information:**

Date: 04.07.2016

Professional degree, Surname, Name: Prof. Dr. Gabriel JIGA