|  |  |
| --- | --- |
| The title of the course | **Multibody dynamics** |
| Faculty | [Faculty of Mechanical Engineering and Computer Science](http://eng.ath.bielsko.pl/index.php/faculties/gerg) |
| The level of studies | Undergraduate (BA) |
| Semester | Winter/summer |
| The form of classes and number of hours | Lecture |
| Classes conducted for Polish students. Erasmus students can join them | Yes |
| Language of instruction | English |
| The number of ECTS | 1 |
| Teacher | dr hab. inż. Andrzej Harlecki, prof. UBB |
| The aims of the course  (maximum 500 characters) | The aim of the course is to give the students the foundations of multibody dynamics. The general aim of this course is to advance their knowledge in the field of broadly taken mechanics. Lecturesinclude informations about the main methods of multibody dynamics. These methods of large practical significance are based on the different mathematical formalisms. The course gives the good introduction to the next courses devoted to computer aided design (CAD). The obtained knowledge can be used in the future the process of virtual prototyping in machine designing. |
| The content of the course: main topics and key ideas | 1. Spatial descriptions and transformations. Description of position of point and orientation of body. Homogenous transform  2. Denavit-Hartenberg notation. Link description. Link connection description. Affixing coordinate systems to links  3. Lagrangian formulation of dynamics manipulator considered as open kinematic chain  4. Lagrangian formulation of dynamics of linkage mechanism considered as closed kinematic chain. Constraint equation formulation  5. Lagrangian formulation of dynamics of a chosen multibody system in the form of bodies interconnected by springs and dampers. Mechanical vibration analysis. Eigenvalue problem |
| Didactics methods | Lectures by using multimedia equipment |
| Course requirements | Exam |
| Literature (basic and supplementary) | Basic  1. Adhwarjee D.K., Theory and Applications of  Mechanical Vibrations, Laxmi Publications  (P) LTD, New Delphi, 2008  2. Craig J.J., Dynamics of Robots: Mechanics and  Control, Prentice Hall, New Jersey, 2004  3. Skalmierski B., Mechanics and Strength of  Materials, Polish Scientific Publishers,  Warsaw, 1979  Supplementary  1. Shabana A.A., Dynamics of Multibody  Systems, Cambridge University Press, New  York, 2010  2. Wittenburg J., Dynamics of Multibody Systems  Springer, Berlin, 2008 |
| The effects of the education   * knowledge * skills * social competences | **knowledge**  He knows basic principles of multibody dynamics and the rules of their efficient application in the practise  **skills**  He is able to solve chosen problems of multiibody dynamics which reflect real engineering tasks  **social competences**  He is able to think independently trying to solve creatively practical problems of multibody dynamics |