

Advanced mechanical design			
Credits: 5 Semester 3 (WUT) Compulsory: No			
Format	Lectures 25 h	Examples/project 15 h	Private study 85 h
Lecturers: K. Mianowski (WUT)			
<p>Objectives: This course presents the design methods for complete complex, precise mechanical structures. The students will learn how to design the mechanical structure together with mounting of actuators, driving systems, localisation of supply cables, controllers etc.</p>			
<p>Contents: The following subjects will be treated: Serial and parallel manipulators – difference in the requirements stated in the design Introduction to material science, Driving elements: their types and performances, Analysis of mechanical efficiency in mechanical systems considering mechanical resistance (<i>i.e.</i> friction) and limited efficiency of driving system and actuators, Actuating systems, specification of required motor power considering the designed robotics system, its mechanical efficiency and working conditions, Design procedure using material science (material choice with material strength analysis) and including driving system, actuators, power supply, etc. Examples considering robots for cardio-surgery, walking machines, mobile robots.</p>			
<p>Abilities: After completing this course the students will be able to: Elaborate a complete design of the mechanism including applied material, driving systems and actuators. Specify the detailed mechanical design (not only conceptual), choose properly the material for construction and specify all mechanical components used for mounting. Design the driving system. Evaluate the overall mechanical efficiency of the system, and select the required actuators. Provide a detailed technical documentation which is required by the work-shop.</p>			
Assessment: 30% continuous assessment and practical work, 70% end-semester exam			
<p>Recommended texts: - A. Morecki, K. Knapczyk (ed.) , <i>Basics of Robotics</i>, Springer Verlag 1999, CISM Courses and Lecture Notes no.402, 1st edition - T. Zielinska, C. Zielinski (eds.), <i>Robot Design, Dynamics and Control, RoManSy 16</i>, CISM - Int. Center for Mechanical Sciences, Courses and Lectures no.487, Springer Wien New York 2006, ISBN-3-211-36064-6</p>			
<p>Further readings: will be provided by lecturers.</p>			