

## **Robotics, 1<sup>st</sup> year, 1<sup>st</sup> semester**

### **64232 Robot kinematics and dynamics**

**Aim of the course:** To learn basics of kinematics, statics and dynamics of robot mechanisms; To examine the coupling of particular variables from the aforementioned areas in real robot mechanisms; To use the equations relating those variables.

**Contents:** Differential displacements; Jacobian matrix of robot manipulator; Statics in robotics; Lagrangian dynamics of rigid robot; Newton Euler dynamics of rigid robot; Properties of dynamic robot models;

The students test the interactive influences between various variables from the areas of kinematics, statics, and dynamics in real robot mechanisms. Practical work runs in smaller groups with advanced robot mechanisms.

### **64233 Advanced measuring systems**

**Aim of the course:** To learn the general concept and structure of measuring systems; To analyze and evaluate the parameters related to dynamics of measuring systems; To get acquainted with the directions of metrology development; To learn thoroughly the modern definitions related to determining measurement uncertainty

**Contents:** Principles of advanced measuring systems and measurability of phenomena; Advanced technologies of quantum metrology; Dynamics in measuring systems; Adjustment of signals and reducing noise in measuring systems; Floating measurements and guarding; Communication buses; Measurements in specific areas

### **64234 Embedded systems in measurements and robotics**

**Aim of course:** Analysis, application, and development of complex embedded systems in the areas of measurement and robotics; Various aspects of software architecture and software design; Getting acquainted with peripheral devices and specific interfaces

**Contents:** Complex embedded systems; Real time system; Dynamic and static linking; Multitasking; Hybrid real time systems; Communications in real time systems; Distributed systems; Reliable embedded systems; Techniques of user interfacing

### **64251 Computer graphics and animation in robotics**

**Aim of course:** Student masters computer design of objects and 2D and 3D computer modeling, constructional and space synthesis and animation

**Contents:** Two- and three-dimensional graphics; Graphic displays; Projections; Parametrization; Colors and shadows; Concepts of animation; Rendering; Presentation of stereo vision; Planning of robot simulations; Development of robot cells