## Robotics for Bioenginnering (RB)
## INDUSTRIAL BIOENGINERING (LAUREA MAG.)

**A.A. 2023/2024|**

| LUN | NA-II-A11 (11h30-13h30) |
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| MER | NA-II-A6 (13h30-15h30) |

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| L1 | 04/03 - Mon | Introduction to robotics and medical robotics |
| L2 | 06/03 - Wed | Pose of rigid body, rotation matrix, composition of rotation matrices |
| L3 | 11/03 - Mon | Orientation representations (Euler angles, angle and axis, unit quaternion), homogeneous transformations |
| L4 | 13/03 - Wed | Direct kinematics, Denavit-Hartenberg convention, Kinematics of typical manipulator structures |
| L5 | 18/03 - Mon | Closed chain, parallelogram arm |
| L6 | 20/03 - Wed | Joint space and operational space, Inverse kinematics problem |
| L7 | 25/03 - Mon | Differential kinematics, geometric Jacobian, Jacobian of typical manipulator |
| L8 | 27/03 - Wed | Kinematic singularities, analysis of redundancy |
| L9 | 3/04 - Wed | Use of redundancy, inverse differential kinematics, analytical Jacobian |
| L10 | 8/04 - Mon | Seminar |
| L11 | 10/04 - Wed | Inverse kinematics algorithms |
| L12 | 15/04 - Mon | Comparison among inverse kinematics algorithms, statics, manipulability ellipsoids |
| L13 | 17/04 - Wedì | Classification of surgical robots |
| L14 | 22/04 - Mon | Seminar |
| L15 | 24/04 - Wed | da Vinci research kit, kinematics and dynamics |
| L16 | 6/05 - Mon | da Vinci research kit: software and control architecture, KUKA & Simulators |
| L17 | 8/05 - Wed | Direct dynamics and inverse dynamics, operational space dynamic model, dynamic manipulability ellipsoid |
| L18 | 13/05 - Mon | Robotic hands and prosthesis |
| L19 | 15/05 - Wed | Postural synergies for desing and control |
| L20 | 20/05 - Mon | Exoskeletons: design and actuation |
| L21 | 22/05 - Wed | Exoskeletons: sensing and control |
| L22 | 27/05 - Mon | Centralized control: PD control with gravity compensation, inverse dynamics control |
| L23 | 29/05 - Wed | Operational space control: PD control with gravity compensation, inverse dynamics control, comparison among various control scheme |
| L24 | 4/06 - Tue | Lab Visit |