



List of topics for admission interviews to a Master's Degree Program Mechatronics

Applicants are expected to have basic knowledge of the following areas:

1. Electrical Circuits and Electrical Engineering Fundamentals

Basic electrical components and their parameters, analysis of electrical circuits, steady-state and transient phenomena, single-phase and three-phase AC circuits.

2. Analog Electronics

Passive and active components, diodes, bipolar and field-effect transistors, IGBTs, characteristics and equivalent circuits, operational amplifiers, basic circuits with operational amplifiers.

3. Digital Electronics

Basic logic gates, combinational and sequential logic circuits, basic principles of digital circuit design, and optimization.

4. Actuators, Electric Machines and Drives

Principles and basic properties of DC motors, induction motors, synchronous motors, BLDC motors, and stepper motors. Operating and load characteristics, starting, braking, speed, and position control.

5. Sensors and Measurement Systems

Sensor characteristics and performance specifications; measurement of displacement, speed, proximity, strain, force, torque, temperature, and pressure; sensor signal conditioning.

6. Dynamic Systems and Automatic Control

Linear time-invariant (LTI) systems, system descriptions, transfer functions, Laplace transform, first- and second-order systems, stability, frequency-response characteristics, Bode and Nyquist methods; feedback, on-off and three-position control, PID control, digital implementation of PID controllers.

7. Programming and Basic Data Structures

Basic proficiency in at least one of the following programming languages: C, Python, or Java. Basic data types, arithmetic and logical operations, conditional statements, loops, functions, arrays, and basic data structures, file handling, and pointers or references.

8. Robotics

Fundamentals of industrial and mobile robotics; types and basic configurations of robotic manipulators (Cartesian, cylindrical, SCARA, spherical, and articulated); robot kinematics, including forward and inverse kinematics; coordinate systems and Denavit–Hartenberg parameters.

Areas 1 to 7 are well covered in the textbook M. Jouaneh, *Fundamentals of Mechatronics*, 2nd ed. Boston, MA, USA: Cengage Learning, 2025, ISBN 978-0-357-68487-0. <https://faculty.cengage.com/works/9780357684870>.

Any introductory text on robotics can be used to study area 8.