**Objectives:** The main objective of Software Architectures for Robotics is to provide the student with methodological tools and practical information about how to design and develop complex software architectures for intelligent robot systems. Robots are becoming complex systems made up of modules and components which behavior is complex in its own right.

Given a specific scenario where a robot must operate autonomously and effectively, the problem of defining a software architecture requires:

1) to define which sensor information is needed and how it must be processed;
2) to couple sensor information and internal representation structures, which are appropriate in terms of efficiency, computational load and usability;
3) to design and develop algorithms to operate on such representation structures;
4) to embed those algorithms in software modules and components, which must be concurrently executed on (typically real-time) operating systems.

The course will provide a reasoned treatment of current state-of-the-art design approaches, development software frameworks (specifically, ROS will be considered), modeling tools and advanced research trends in this field, as well as a comprehensive discussion about typical scenarios, solutions and use cases.

**Syllabus:** The exam consists in the design and the development of a software architecture for a limited and well-defined problem (and an associated report) or a bibliography research on an agreed topic.

**Abilities:** After completing the course, the student will be able to design complex architectures for robots, deciding to exploit existing solutions or developing new ones, choosing appropriate data structures, algorithms and software frameworks for their implementation.

**Prerequisites:** A basic knowledge of C/C++ is required.

**Grading policy:** 80% exam + 20% continuous assessment (i.e., assignments).

**Office hours:** A meeting with the teacher can be set by appointment.

**References:** Relevant material will be given by the teacher during lectures.