

7. **RAI 816: Robot Design**

a. **Textbook**

- Embedded Robotics: Mobile Robot Design and Applications with Embedded Systems by Thomas Bräunl (Springer), Introduction to Robotics by John J. Craig
Handouts and research articles may also be used by the instructor.

b. **Objective**

- Robots have multifaceted applications benefitting industry, research and our individual lives. The design of robots therefore is a multidisciplinary field that spans from modeling to simulating robotic mechanisms while keeping in view the electrical, mechanical, programming and control aspects of the realistic robotic constraints. This course intends to combine these ideas with special emphasis on practical pros and cons pertaining to robot design.

c. **Pre-Requisite:** Nil

d. **Course Outcome**

- During the course, students will learn the principles of robot design, practical dos-and-don'ts and gain a practical understanding of selection of electrical, mechanical components and algorithms. Students will participate in design studies and understand the various mechatronic trade-offs, so that they can use this knowledge in the design of robots from a practical perspective in their future.

e. **Course Outline:** The students will be introduced to some of the basic robots from a design analysis perspective. The various components that perform motions will be introduced to the students to introduce them to the variety of actuators and materials commonly available. Electronic Components and hardware will also be introduced and finally popular algorithms based on applications will be introduced to the students as well. Design software may be utilized where required

- Classification of Robotic Tasks
- Task based Robotic System Modelling
- Sensors Selection
- Actuators Design and Selection
- Mechanical Power and Transmission
- Electronic Design
- Instrumentation and Embedded Systems
- Control Strategies