5. **RAI 814: Rehabilitative and Assistive Robotics**
   a. **Textbook**
      - Wearable Robots: Biomechatronic Exoskeletons by Jose Pons (Wiley Publishers) Handouts and research articles may also be used by the instructor.
   b. **Objective**
      - A wearable robot is a mechatronic system that is designed around the shape and function of the human body, with segments and joints corresponding to those of the person it is externally coupled with. Tele-operation and power amplification were the first applications, but after recent technological advances the range of application fields has widened. These robots have to support the motion of human limbs and are valuable in the process of rehabilitation as strength augmentation. This course will enable the students to get an insight into the design and control challenges of such robots.
   c. **Pre-Requisite:** Nil
   d. **Course Outcome**
      - By the end of this course the students will be well-versed in Biomechanics and Human Interaction. Models of Bio-inspiration along with their actuation requirements will also be introduced to the students and design of systems that enable these motions will be focused.
   e. **Course Outline:** The mechanics of the wearable robot and it's biomechanical interaction with the user, including state-of-the-art technologies will be covered. The basis for bioinspiration and biomimetism, general rules for the development of biologically-inspired designs, and how these could serve recursively as biological models to explain biological systems and finally the incorporation of this knowledge in the design of exoskeletons and prosthetic limbs will be taught.
      - Bioinspiration and Biomimetism
      - Biological Models
      - Human Machine Interfacing
      - Robot Actuation
      - Sensing and Instrumentation
      - Compliance in Design
      - Design of Rehabilitative Robots
      - Design Considerations in Robot Assistance