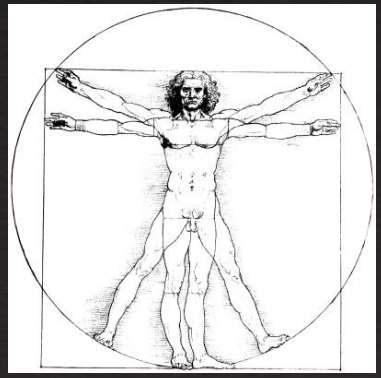
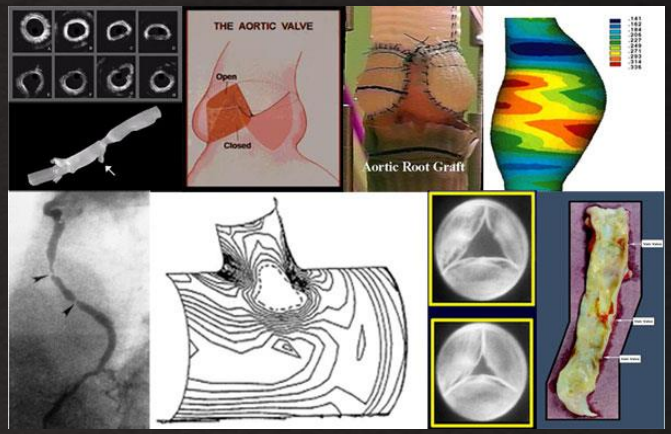
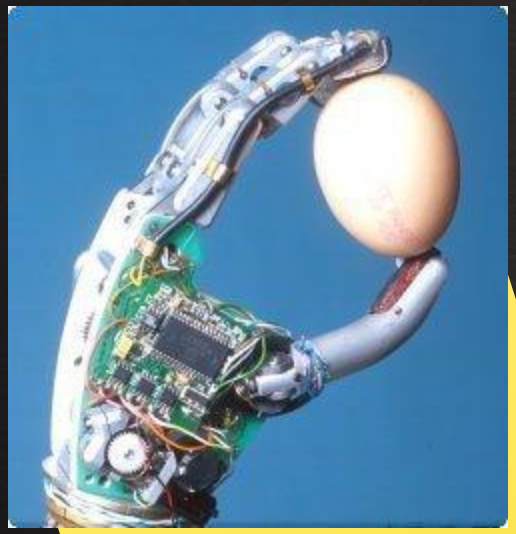






Biomedical Engineering

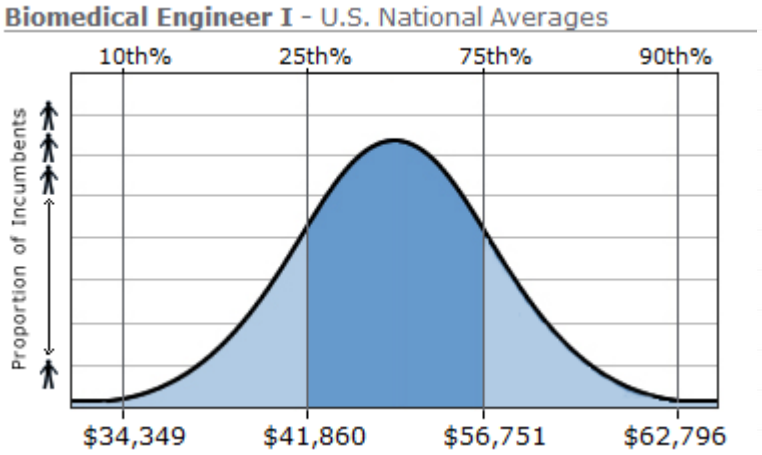
Biomedical Engineering at the University of Hartford

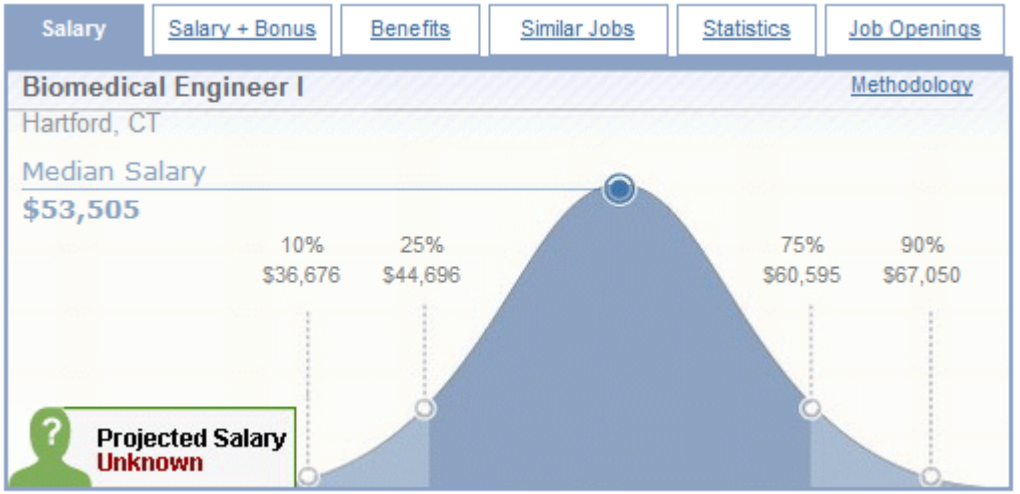
- Within the Department of Civil, Environmental, and Biomedical Engineering
- 2 Faculty Members
  - Arico, Mary C.
  - Nowak, Michael (Program Director)
- Offerings
  - Biomedical Engineering
    - Pre-med option
    - EE track (new)
  - For non majors
    - Minor in Biomedical Engineering
- Program features
  - Research internship
  - Clinical internship
  - Two semester senior project

Biomedical Engineering Employment

- Employed in universities, industry, hospitals, research facilities, and government regulatory agencies.
- Often serve a coordinating or interfacing function, using their background in both the engineering and medical fields.
  - Create designs where an in-depth understanding of living systems and of technology is essential.
  - Conduct performance testing of new or proposed products.
  - Establish safety standards for devices.
  - Provide advice on the selection and use of medical equipment, as well as supervising its performance testing and maintenance.
  - Build customized devices for special health care or research needs.
  - Supervise laboratories and equipment
  - Participate in research activities in collaboration with other researchers with such backgrounds as medicine, physiology, and nursing.

Biomedical Engineering Employment





Job Description for Biomedical Engineer I New Search

Designs, develops and provides safety testing, repair, and maintenance of biomedical equipment. Ensures that the biomedical equipment is in compliance with applicable regulatory requirements and quality control standards. Requires a bachelor's degree and 0-2 years of direct experience in the field. Familiar with a variety of the field's concepts, practices, and procedures. Relies on limited experience and judgment to plan and accomplish goals. Performs a variety of tasks. A certain degree of creativity and latitude is expected. Typically reports to a supervisor or manager.

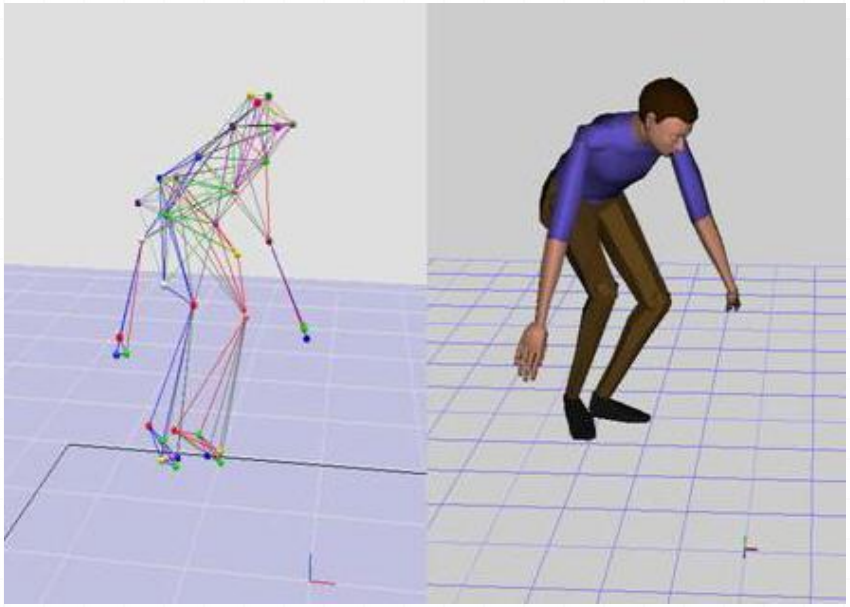
Data from salary.com

What is Biomedical Engineering?

- Using engineering, math, and science, to make people live **safer**, **healthier**, and **happier** lives!
- Three main areas
  - Biomechanics
  - Tissue and cellular
  - Imaging and technology

Biomechanics

- Motion evaluation and analysis



Biomechanics

- Motion evaluation and analysis

Biomechanics

- Orthopedics

What is Orthopedics?

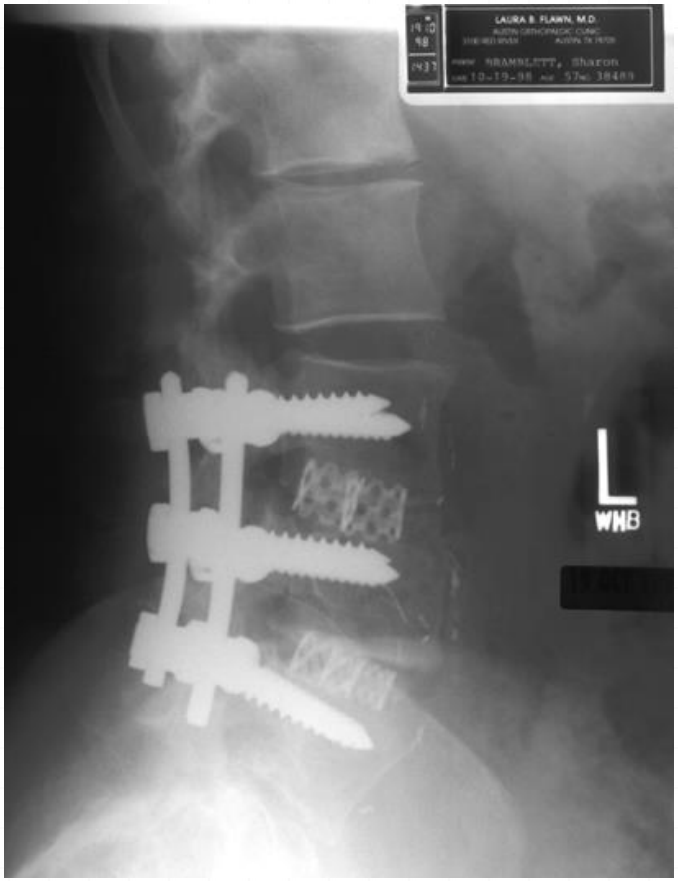
- Most people will see an orthopedic specialist at some time in their life--some people frequently, yet there is often confusion about what the orthopedics specialty means.
- Orthopedics is the study of the musculoskeletal system. Orthopedic doctors specialize in diagnosis and treatment of problems of the musculoskeletal system.

- The musculoskeletal system includes:

- Bones
- Joints
- Ligaments
- Tendons
- Muscles
- Nerves

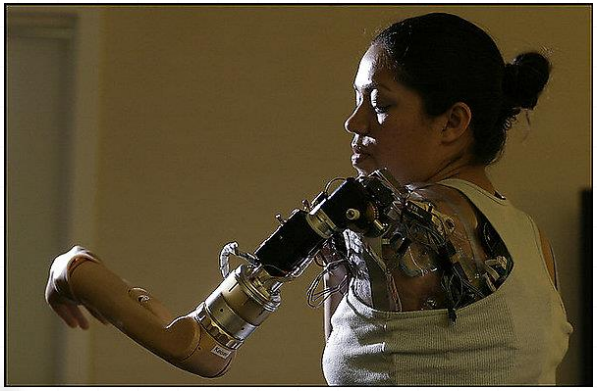
Biomechanics

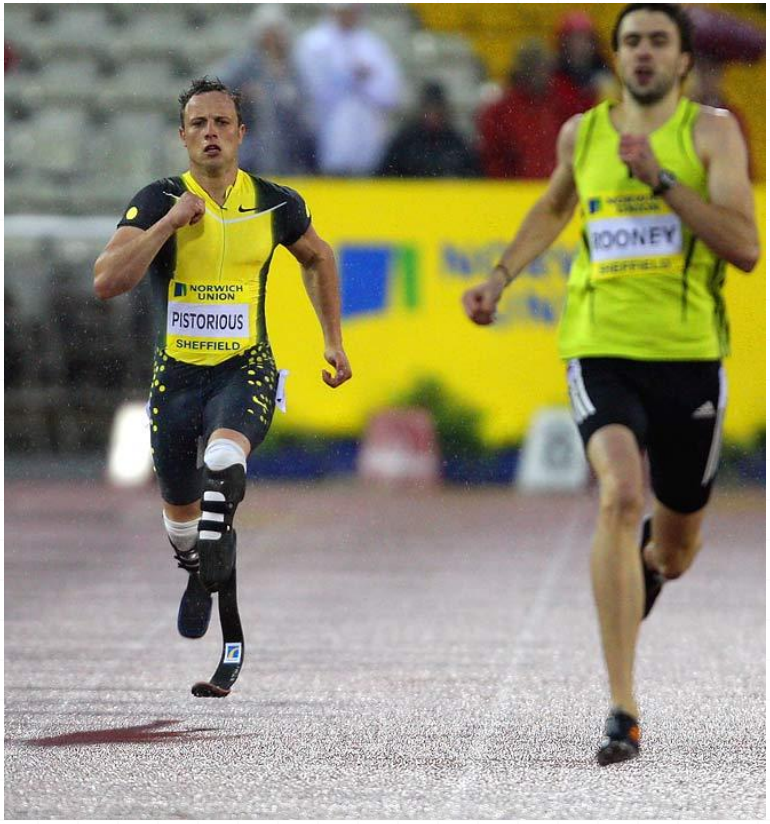
- Orthopedics



Biomechanics

- Prosthetics and orthotics



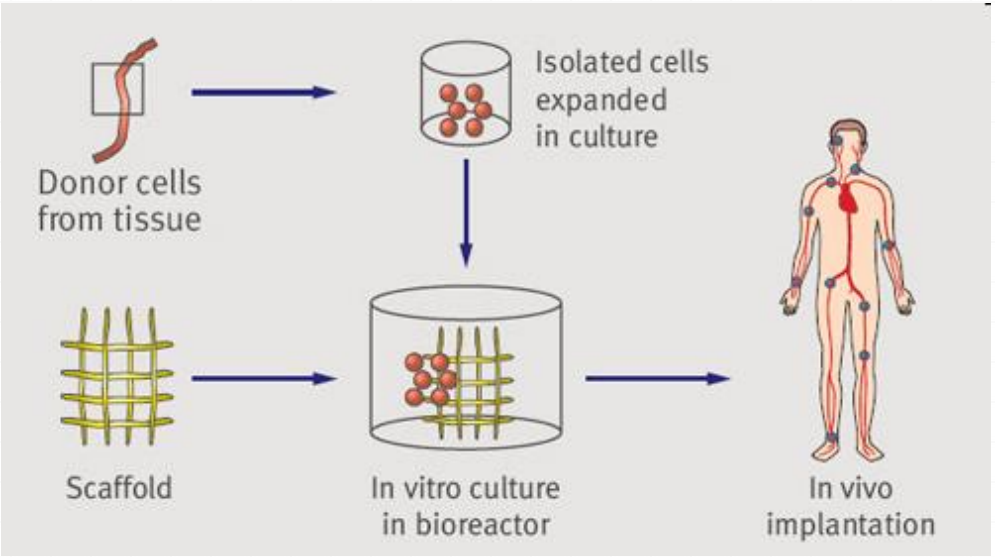


Biomechanics

- Injury prevention and rehabilitation

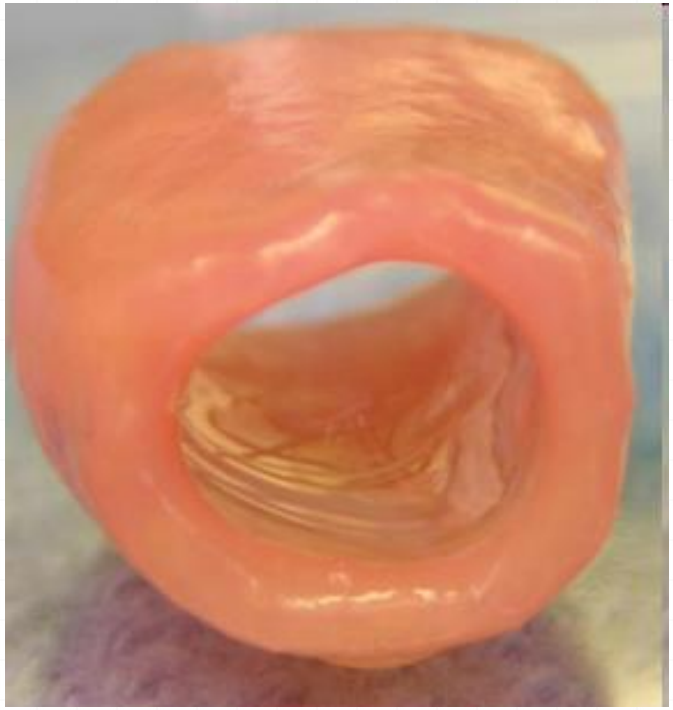
Tissue and Cellular

- Artificial scaffolds to simulate growth
  - Cartilage
  - Bone
  - Skin
  - Organs
  - Cells



Tissue and Cellular

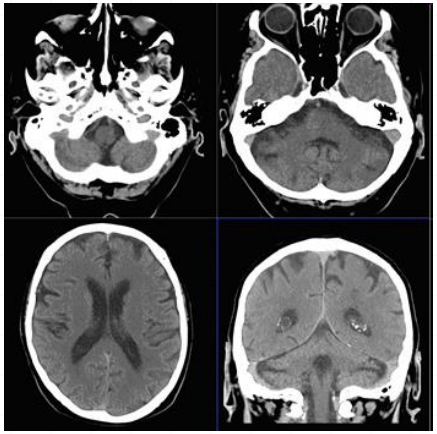
- Stem cells

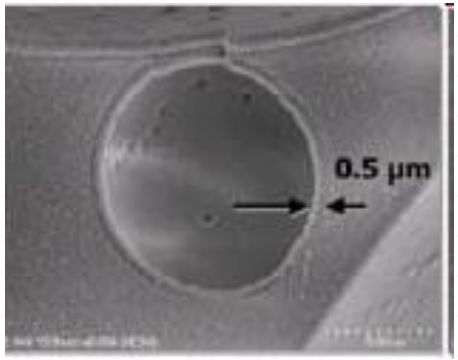


(from Children's Hospital in Boston)

Imaging and Technology

- Imaging modalities
- Drug delivery systems





MRI

- Magnetic resonance **imaging** (**MRI**) is a test that uses a magnetic field and pulses of radio wave energy to make pictures of organs and structures inside the body.

- In many cases, **MRI** gives different information about structures in the body than can be seen with an X-ray, ultrasound, or computed tomography (CT) scan.

Student Clubs

- BMES: Biomedical Engineering Society

Design Challenge

- Break into Boe-Bot groups.
- Design a surgical device to laparoscopically remove a tumor using the materials given.
  - Chop sticks, 2 paper clips, 3 rubber bands, 8.5”x11” sheet of paper, plastic lid, plastic spoon, 1 foot of tape.
- Starting at 10:20am, we will conduct a competition to determine who can perform the surgery in the fastest time.
  - One or more members of your group may perform the surgery.
  - Only the existing access holes may be used.
  - Your goal is to surgically remove the tumor without damaging it and without disturbing the surround tissue.
  - Disturbing the tissue or damaging the tumor will disqualify the group.
  - We will record the time required to successfully remove the tumor.
- The group who successfully removes tumor the fastest wins. The members of the winning group are exempt from taking the next quiz and will receive a 10.