

# BIOE-ME 485 Spring 2017

Welcome to the main resource page for BIOE/ME 485: Modeling and Simulation of Human Movement. This course was taught by Prof. Scott Delp at Stanford University in the Spring, 2017 quarter. Variations of this course have been offered by instructors elsewhere:

- B.J. Fregly at University of Florida
- Rick Neptune at The University of Texas at Austin
- Jeff Reinbolt at The University of Tennessee ([course webpage](#))
- Darryl Thelen at University of Wisconsin–Madison

## Student Project Pages

- [Accurate orientation estimation of the head/neck using inertial measurements units](#)
- [An Analysis of Safe Range of Motion after Rotator Cuff Tear Repair using Musculoskeletal Modeling](#)
- [Estimating Bone on Bone Forces During FES Rowing](#)
- [How to Tune a Tuna: Resonance of Locomotor Structure](#)
- [OpenSim Modeling of the Avian Downstroke](#)
- [Optimizing A Passive Assistive Device](#)
- [Simulation-Based Design for a Wearable Assistive Device: Supporting Elderly People during Sit-to-Stand](#)
- [Simulation-based soft exosuit design](#)
- [Simulation of Falling in the Elderly and Motor-Impaired](#)
- [The Effect of Gastrocnemius Avoidance Gait on Knee Loads](#)
- [The Stretch Reflex and Postural Control During Disturbed Quiet Stance](#)
- [Using Inertial Measurement Units to Calculate Knee Flexion Angle](#)

## Assignments

### OpenSim Tutorials

- [Tutorial 1 - Intro to Musculoskeletal Modeling](#)
- [Tutorial 2 - Simulation and Analysis of a Tendon Transfer Surgery](#)
- [Tutorial 3 - Scaling, Inverse Kinematics, and Inverse Dynamics](#)

### Lab 0 (done in ME 281)

- [Simulation-Based Design to Prevent Ankle Injuries](#)

### Lab 1

- [The Strength of Simulation: Estimating Leg Muscle Forces in Stance and Swing](#)

### Lab 2

- [Pulling Out the Stops: Designing a Muscle for a Tug-of-War Competition](#)

### Lab 3

- [Deprecated\\_CPP\\_From the Ground Up: Building a Passive Dynamic Walker Model](#)

### Lab 4 (in-class exercise)

- [Sky High: Coordinating Muscles for Optimal Jump Performance](#)

## Resources

### Documentation

- [OpenSim 3.3 Documentation \(doxygen\)](#)
- [Simbody 3.5 Documentation \(doxygen\)](#)
- More Simbody documentation can be found [on simtk.org](#) and [on GitHub](#)

### Getting Started with OpenSim

- [Download OpenSim](#)
- [Running OpenSim on Mac OS X or Linux using a Windows Virtual Machine](#)
- [Examples and Tutorials](#)
- [C++ API Examples](#)
- [Adding New Functionality](#)
- [Scripting in the OpenSim GUI, MATLAB, and Python](#)
- [OpenSim User's Forum](#)
- [OpenSim repository on GitHub](#)

## Project Links

- See project videos from previous offerings of the course:
  - [BIOE-ME 485 Spring 2013](#)
  - [BIOE-ME 485 Spring 2014](#)
- [Tips for creating videos](#)
- [Free software for creating a video from a sequence of pngs \(RAD Video Tools\)](#)
- [Free screen recording software \(CamStudio\)](#)