

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 409. Interdisciplinary Study in Biomechanics. (4 Units) Elective

Course Description: (2019-20 Catalog)	Examination of human motion biomechanics. Experimental and analytical methods in motion analysis based on rigid body dynamics. Protocols for protection of human subjects in research. Hypothesis-driven research in interdisciplinary teams, including written proposal development and written/oral communication of results to a scientific audience. 1 lecture, 3 activities. Crosslisted as BMED/KINE/ME 409.
Prerequisite Courses:	BMED 410 and CE 207; or KINE 403; or ME 326.
Prerequisites by Topic:	This is dependent on the major. MEs will have background in three-dimensional analysis of dynamic systems. BMED students will have in introductory course in biomechanics, and KINE students will have background in human motion and electromyography.
Textbook: (and/or other required material)	None.
References:	Various research articles and reference materials.
Course Coordinator/Instructor:	Brian P. Self, Professor of ME Scott Hazelwood, Professor of BMED Christie O'Hara, Lecturer of KINE
Course Learning Outcomes:	The student will be able to: <ol style="list-style-type: none">1. Apply fundamental principles in engineering and kinesiology to conduct motion analysis experiments, calculate biomechanical loads, and interpret results.2. Differentiate between different load resultant components (force, moment) and types (joint resultant, joint contact, muscle, soft tissue).3. Discuss the ethical implications of human subject protection and create a protocol for human subjects protection for motion analysis research.4. Design a hypothesis-driven research project in human motion biomechanics that has clinical relevance.5. Execute a hypothesis-driven research project.6. Effectively communicate research findings in both written and oral form.

7. Discuss the benefits and challenges of working on an interdisciplinary team.

Relationship of Course to Mechanical Engineering Student Outcomes:

SO 1: Master (M)
SO 2:
SO 3: Master (M)
SO 4: Master (M)
SO 5: Master (M)
SO 6:
SO 7:

Topics Covered:

1. Research methods, study design, human subjects review
2. Review of forces and kinematics.
3. Introduction to electromyography and other instrumentation used in biomechanics.
4. Gait analysis, data collection, data processing.
5. Statistical analysis and communicating scientific results.

Laboratory Projects:

This is a project-based course where teams of students (goal is to have at least 1 ME, 1 BMED, and 1 KINE per team) develop and conduct their own research project. Six hours per week is spent teaching them various lab techniques and then having them collect data on their projects.

Class/Lab Schedule:

One 50-minute lecture, three 110-minute activities period per week.

Contribution of Course to Meeting the Professional Component:

(a) College-level mathematics and basic sciences:	0 credits
(b) Engineering Topics: Design?	4 credits No
(c) General Education:	0 credits
(d) Other:	0 credits

Prepared by: Brian P. Self

Date: 2/27/2020
