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**Ph.D. Qualifying Exam: Biomechanics**

Department of Mechanical Engineering University of Utah

**Exam Description:**

The objective of this exam is on the topic of biomechanics. The reference textbooks and course material that serve as a basis for this exam are taken from ME EN 6535 Introduction to Biomechanics The exam emphasizes applications to the human body including the following topics: human anatomy and anthropometry; applications of statics and dynamics to evaluate forces and their consequences; experimental techniques in biomechanics; stress and strain in tissues, with particular application to bone; material anisotropy; viscoelasticity; muscle mechanics; and soft tissue mechanics. Students should be able to:

* Perform whole body statics and dynamics analysis
* Perform whole body motion capture and force analysis using experimental techniques
* Develop an appreciation of how environmental conditions and microstructural features of biological tissues contribute to the mechanical response of the human body
* Quantify the viscoelastic responses of biological tissues
* Quantify biological soft tissue mechanics.

**Recommended References:**

TBD

**Exam Materials:**

TBD

# Topics:

 Exam topics include:

* Anthropometry
* Kinematics
* Kinetics
* Muscle and join mechanics
* Gait analysis
* Signal processing
* Data acquisition
* Filtering
* Mechanics of biological materials and experimental design,
* Biological constituents and structure
* Generalized Hooke’s law
* Bone mechanics
* Viscoelasticity
* Imaging techniques and analysis