King Saud University
College of Applied Medical Sciences
Department of Biomedical Technology
BMT 228 Introduction to Biomechanics 2 (2-0-0)

Current Instructor: Prof. H.S. Ranu, Fellow ASME
Course Coordinator: Prof. H.S. Ranu
Coordinator's email: hranu@ksu.edu.sa

Textbook(s) and/or Other Required Materials:
Primary: Barnet F. LeVeau, "Biomechanics of human motion", 3rd Edition,W.B. Saunders Company. Other supplemental materials: Class Notes by Prof. Ranu, PhD, Fellow ASME

Course Description (catalog): This course addresses the basic topic of Biomechanics making use of the concepts of statics, free body diagram and Newton's laws

Prerequisites: BMT 224
Co-requisite: None
Course Type: Mandatory

Course Learning Outcomes: Upon completing BMT228, students should have the following capabilities:
- Knowledge of mechanical principals and how they apply to human body
- Knowledge of fields and areas in which biomechanics applies
- Understanding the stress-strain (constitutive) equations and how stress relates yield and failure prediction concept
- Overview on strength of materials applied to biomechanics
- Familiarity with statics equilibrium of biomechanical systems
- Introduction of friction force in the analysis of biomechanical systems

Student Outcomes Covered by Course:
a. an ability to select and apply the knowledge, techniques, skills, and modern tools of biomedical technology to include the application of circuit analysis, analog and digital electronics, microcomputers, biomechanics, biomedical instrumentation systems, and safety in the building, testing, operation, and maintenance of biomedical equipment.
Students are able to apply the fundamental concepts in mechanics e.g., composition and resolution of forces, free body diagram as well as the static equilibrium in building and analyzing biomechanical systems
b. an ability to select and apply a knowledge of mathematics, chemistry, physics, and biological sciences, engineering, and technology to building, testing, operation, and maintenance of biomedical equipment and the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of biomedical systems.
Students are able to use engineering concepts and graphical representation in addition to biological science knowledge to address real life examples in biomechanics. Discrete mathematics and statistics is of great help in such an area where parameter discrepancies are observed

c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.
d. an ability to analyze, design, and implement biomedical systems, components or processes for broadly-defined engineering technology problems appropriate to program educational objectives.
e. an ability to function effectively as a member or leader on a technical team.

f. an ability to identify, analyze, and solve broadly-defined biomedical technology problems.
Students upon course accomplishment are able tackle a large number of problem categories related to biomechanics by identifying the primary parameters affecting the results, analyzing their effects, solving and optimizing the solution whenever applicable

g. an ability to apply written, oral, and graphical communication in both technical and nontechnical environments; and an ability to identify and use appropriate technical literature.

h. an understanding of the need for and an ability to engage in self-directed continuing professional development.
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.
j. a knowledge of the impact of engineering technology solutions in a societal and global context and an understanding of the clinical application of biomedical equipment.
k. a commitment to quality, timeliness, and continuous improvement.

Major Topics covered and schedule in weeks:
1. Anatomy, Growth, External load, Trauma
2. Ergonomics, clinical applications, protective equipment, body movement
3. Force, Types of force, free (space & body) diagrams
4. Other types of load, Other terms, Newton's laws
5. Stress – strain, Types of stresses, Rheological properties
6. Mechanical properties and material testing
7. Composition of forces Resolution of forces
8. Real life examples of composition & resolution of forces
9. Static Equilibrium (linear & planar forces) Pulleys and levers
10. Friction – basics of friction, Friction problems in biomechanics