

## ME C176; BIO ENG C119: Texts on Reserve

### Directly Relevant to Course Material (on one-day reserve):

- Burstein AH and Wright TM: *Fundamentals of Orthopaedic Biomechanics*, Williams and Wilkins: Baltimore, MD, 1994. Excellent introductory text, with many of the basic concepts very well explained. Emphasis is on explaining basic concepts rather than in-depth engineering analysis. Covers joint statics (including joint stability), mechanical behavior of bone and skeletal structures, and design of artificial joints (mainly hip and knee).
- Cowin SC: *Bone Mechanics Handbook*, 2<sup>nd</sup> edition, CRC Press, Boca Raton, FL, 2001. Comprehensive book on the state-of-the-art in bone biomechanics research and knowledge. Excellent resource.
- Mow VC and Hayes WC: *Basic Orthopaedic Biomechanics*; 2nd Edition, Lippincott-Raven: Philadelphia, PA, 1997. Excellent all-round text. Covers joint statics, gait dynamics, bone, cartilage, tendons/ligaments, spine mechanics, joint lubrication, fracture fixation, and total joint replacement. Style is inconsistent since it's written by many different authors, but these authors are the best in the field of orthopaedic biomechanics.
- Netter FH: *Atlas of Human Anatomy*; CIBA-GEIGY Medical Foundation: West Caldwell, NJ, 1989. Excellent book: fabulous graphics but no text.
- Nigg BM and Herzog W: *Biomechanics of the Musculo-Skeletal System*, John Wiley and Sons: Chichester, England, 1994. Excellent all round book, with sections on musculo-skeletal tissues, measuring techniques, and mathematical modeling. Most interesting for its section on modeling, particularly for impact and fall dynamics.
- Nordin M and Frankel VH: *Basic Biomechanics of the Musculoskeletal System*, 2nd Edition, Lea & Febiger, Philadelphia, PA, 1989. Comprehensive range of topics and very well illustrated. Covers almost all of our course material, but the treatment tends to be qualitative.
- Walker PS: *Human Joints and Their Artificial Replacements*; Thomas: Springfield, IL, 1977. Classic and comprehensive text on the design of artificial prostheses. While clearly dated, it nonetheless addresses many of the fundamental design issues. Nice historical perspective on the development of total joint prostheses.
- Dowson D and Wright V: *Introduction to the Biomechanics of Joints and Joint Replacement*; Mechanical Engineering Publications Ltd.: London, 1981. Comprehensive text on design of artificial joints, with an emphasis on the lubrication and tribology of both natural and artificial joints. Good general text for this subject matter, but again, it's a little dated.
- Martin RB and Burr DB and Sharkey NA: *Skeletal Tissue Mechanics*; Springer, New York, 1998. Excellent text on bone adaptation and general orthopaedic tissue and skeletal mechanics (no implant work), with particularly unique chapters on mathematical analysis of bone adaptation and fatigue.
- Kurtz SM: *The UHMWPE Handbook*, Elsevier Academic Press: San Diego, CA, 2004. A comprehensive text on biomaterials used in joint replacement. Covers history, manufacturing, mechanical properties, and clinical applications of ultra-high molecular weight polyethylene (UHMWPE).

### Additional Books of Interest (on one-week reserve):

- Black J and Hastings G: *Handbook of Biomaterial Properties*, Chapman and Hall, London, 1998. Excellent reference book for material properties for a wide range of bioengineering applications.
- Currey JD: *The Mechanical Adaptation of Bones*; Princeton University Press: Princeton, NJ, 1984. Interesting read which goes way beyond human applications.

- Currey JD: *Bones. Structure and Mechanics*. 2<sup>nd</sup> edition of above text. Nicely updated and very readable.
- Evans FG: *Mechanical Properties of Bone*; Charles C. Thomas: Springfield, IL, 1973. Classic text, included in this list mainly because of its historical significance (some of the data are out dated, derived from techniques that have been found to have flaws). Ironically, many of the issues addressed in this text have still not been resolved.
- Fung YC: *Biomechanics—Motion, Flow, Stress, and Growth*; Springer-Verlag: New York, NY, 1990. Good general text (extends to many applications) on biomechanics from stresses in bones to blood flow. Written by one of the “giants” in the field. Plenty of quantitative treatments.
- Fung YC: *Biomechanics—Mechanical Properties of Living Tissues*, 2nd Edition; Springer-Verlag: New York, NY, 1993. Ditto comments. Emphasis here on constitutive properties.
- Gibson LJ and Ashby MF: *Cellular solids: structures & properties*; Pergamon Press: Oxford, England, 1988. Excellent text on the mechanics of cellular solids, including chapters on trabecular bone and wood.
- Grabiner MD: *Current Issues in Biomechanics*; Human Kinetics Publishers: Champaign, IL, 1993. Oriented towards clinical applications of biomechanics. Nice chapter on low-back biomechanics (not very quantitative) and clinical gait analysis. Also has chapters on ligaments and muscle.
- Hall S: *Basic Biomechanics*; Mosby-Year Book, Inc.: St. Louis, MO, 1991. Very qualitative treatment of biomechanics, geared towards physiotherapists etc. Nice review of musculoskeletal anatomy in first few chapters. Interesting comments throughout the text on clinical and practical applications.
- Martin RB and Burr DB: *Structure, Function, and Adaptation of Compact Bone*; Raven Press: New York, NY, 1989. Main emphasis is on structure and behavior of osteonal bone tissue (which makes up most of human cortical bone). Good treatment, though very qualitative — even speculative — when it comes to mechanics.
- McMahon TA: *Muscles, Reflexes, and Locomotion*; Princeton University Press: Princeton, NJ, 1984. Excellent text on muscle mechanics and locomotion. Very readable, with fascinating historical developments.
- Mow VC and Ratcliffe A and Woo SLY: *Biomechanics of Diarthrodial Joints*, Volumes 1 and 2; Springer-Verlag: New York, NY, 1990. Excellent text on most aspects of orthopaedic biomechanics. Style is choppy since it’s written by many different contributing authors. Some of the treatments are advanced. Probably the most broad general review of research in orthopaedic biomechanics for its time, but it’s now quite dated.
- Park JB and Lakes RS: *Biomaterials: An Introduction*, 2nd Edition; Plenum Press: New York, NY, 1992. Not too well written, but still informative, text on biomaterials. Covers all the major materials, from bone to ceramics to polymers to metals. Not limited to orthopaedics.
- Rose J and Gamble JG: *Human Walking*, 2nd Edition; Williams and Wilkins: Baltimore, MD, 1994. Comprehensive text on gait and motion analysis.
- Wainwright SA: *Mechanical Design in Organisms*; Halsted Press: New York, NY, 1976. Very interesting text that looks at mechanical design of many different types of organisms. Fascinating and thought-provoking.

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