BEEC's Community Book Recommendations:

Contributors:

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What makes a good book?

- Order that material is presented. If disorganized it makes it hard
- Content Scaffolding
- Level of conceptual explanation (that it matches the level of students)
- Purpose of textbook (e.g. practical, theory, application)
- Good work examples
- Opportunities of practice and recall
- Downside - questions tend to be about spitting back rather than reflection
- Access to a digital version
- Good figures and images (that can be matched with class)
- Up-to-date with information

Highlight Books:

Topics:

Example:
Book Title: Principles of Biomedical Instrumentation
Author: Andrew G. Webb
Course/Topic: Circuits/Bioinstrumentation/Devices
Community Comments:

Anatomy / Physiology

Book Title: Medical Physiology: A System's Approach
Author: Lange
Course/Topic: Pathology / Physiology
Community Comments: Medically-focused. Useful for upper-level or graduate course that goes in-depth with understanding systems in the body.

Book Title: Human physiology: From cells to systems
Author: Sherwood
Course/Topic: Systems physiology
Community Comments:Overall focus on maintaining homeostasis; looks at the relationship between structure and function; systems focus

Book Title: Quantitative Human Physiology
Author: Feher

Course/Topic: Quant physiology
Community Comments: Good for overviews and some checks for understanding - good figures

Bioimaging

Book Title: Medical Imaging Signals & Systems
Author: Prince & Links
Course/Topic: Introduction to Biomedical Imaging
Community Comments: Derives mathematical foundations of imaging signals, integrates concepts into systems-level topics. Covers X-ray, ultrasound, CT, Radiologic, MRI, & other. systems. Accessible, but **useful as 3rd year text or above.**

Book Title: Digital Image Processing
Author: Gonzalez & Woods
Course/Topic: Signal / Image processing
Community Comments:

Book Title: Optics
Author: Eugene Hecht
Course/Topic: Optics / Introduction to optics
Community Comments: Broad theory & background for optics in general. Very useful for this specific topic, very thorough. However is not geared specifically towards BME applications.

Book Title: Quantitative Biomedical Optics
Author: Bigio and Fantini
Course/Topic: Optics & Biomedical Applications
Community Comments: Balance of fundamentals, inclusion of brief statistical tests, and general overview of multiple optical imaging techniques, primarily focused on diffuse optics.

Bioinstrumentation

Book Title: Principles of Biomedical Instrumentation
Author: Andrew G. Webb
Course/Topic: Circuits/Bioinstrumentation/Devices
Community Comments: Really good examples, depending on the circuit background students have. Not suitable for students that have not taken circuits.

Book Title: Medical Instrumentation: Application and Design
Author: John G. Webster
Course/Topic: Circuits/Bioinstrumentation/Devices
Community Comments:

Biomedical Signals and Systems

Book Title: Linear Systems and Signals
Author: B.P. Lathi and Roger Green
Course/Topic: Signals and Systems
Community Comments: pros: -easy to read presentation of the theory, - nice figures and graphs, -ebook available. Cons: -errors in solutions, -Matlab example a bit out of date, - no direct link to BME applications

Book Title: Signals and Systems using MATLAB
Author: B.P. Chaparro and Allen
Course/Topic: Signals and Systems / Digital signal processing
Community Comments: pros: -nice MATLAB examples with source code. Cons: - no direct link to BME applications

Book Title: Circuits, Signals and Systems for Bioengineers: A MATLAB Based Introduction
Author: John Semmlow
Course/Topic: Biomedical Signals/Systems
Community Comments: Pretty standard signals book (aka very dry) but at least focused on bioengineering specifically for example problems and context. Also includes circuit elements so could be used in a hybrid instrumentation/signals course.

Book Title: The intuitive guide to Fourier Analysis & Spectral estimation
Author: Charan and Langton
Course/Topic: Signals with a focus on Fourier Series and Transform
Community Comments: it's not exactly a textbook, but it explains the heavy abstract math involved in the Fourier Series and Transform in plain english (very simple language). Nice supplemental reading.

Title: Physiological Control Systems
Author: Michael Khoo
Course/Topic: Control systems
Comments: has several good MATLAB & Simulink examples to simulate body systems

Biomaterials

Book Title: Biomaterials: The Intersection of Biology and Materials Science
Author: Mikos
Course/Topic:
Community Comments: currently used for a junior level biomaterials course at West Chester

Book Title: Biomaterials Science
Author: Ratner
Course/Topic: High level overview, but has some good conceptual questions in it
Community Comments: Also covers some biomechanics and tissue engineering

Biomechanics

Book Title: Fundamental of Biomechanics [**resource, not required**]
Author: Knudson
Course/Topic:
Community Comments:

Skeletal Tissue Mechanics, Martin 2015

Book title: Fundamentals of Biomechanics: Equilibrium, Motion, and Deformation. Springer 2012
Author: *Ozkaya N*
Course: Biomechanics
Comments: Covers everything from statics and dynamics through biomechanics. Fits well in our program since we don't have a traditional statics course so it's more vertically integrated. Also includes information about function anatomy and application to the human body (also has traditional kinematics, e.g., car on a road, examples)

Book Title: Sports Biomechanics, The Basics: Optimizing Human Performance
Author: Anthony Blazevich
Course/Topic: Sports Engineering/Biomechanics
Community Comments: Really good grounding in how biomechanics arises from basic physics concepts, with each topic centered around a case study/question. Great incorporation of modelling techniques as well. A bit outdated (2007)

Book Title: Basic Biomechanics of the Musculoskeletal System; 4th Edition; 2012
Author: Nordin & Frankel

Book Title: Basic Biomechanics; (McGraw Hill); 9th edition
Author: Hall

Biomechanics: Mechanical Properties of Living Tissues
Authors: Yuan-Cheng Fung
Comments: more at graduate student level but SO good for a deep understanding

Biomedical Engineering Education

Book Title: The Art of Problem Solving
Author: Ackoff
Course/Topic: PBL problem solving courses
Community Comments:

Book Title: Cambridge Handbook of Engineering Education Research
Author: Johri and Olds
Course/Topic: Provides an overview of the field of engineering education research as of 2014. I think there may be a newer edition of this in the works.
Community Comments:

Book Title: Bioengineering Fundamentals
Author: Saterbak, McIntire, San
Course/Topic: Principles of problem solving in bioengineering and human organ systems
Community Comments: used very effectively in conjunction with problem-based learning courses.

Suggestions from Kaitlin Mallouk at Rowan University
Teaching and Learning in STEM (Felder and Brent)
McKeachie's Teaching Tips (McKeachie and Svinicki)
How Learning Works (Ambrose et al.)
Teaching Engineering (Wankat and Oreovicz)
Uncommon Sense Teaching (Oakley)
Teaching What You Don't Know (Huston)
How Humans Learn (Eyler)
Powerful Teaching (Agarwal & Bain)

Biotransport

Book Title: Transport Phenomena
Author: BIrd, Stewart, and Lightfoot
Course/Topic: Advanced transport - the bible of heat and transport
Community Comments: not BIOE specific

Book Title: Advanced Transport PHenomena
Author: John Slattery
Course/Topic: Advanced transport - good for some theory explanations in fluids,mass transport
Community Comments: not BIOE specific

Book Title: Biotransport Principles and Applications
Author: Roselli and Diller
Course/Topic: Bio-related examples
Community Comments: BIOE specific

Book title: Transport Phenomena in Biological Systems
Author: G.A. Truskey, F. Yuan, D.F. Katz,
Course/topic: transport and fluids
Community comments: lots of problems, not much theory explanation

Cell/Tissue Engineering

Book Title: Cells: Molecules and Mechanisms
Author: E.V. Wong
Course/Topic: Intro/Cell Biology
Community Comments: Open Access (pdf and web-based), parallel sections for intro both level and advanced level

Circuits

Book Title: Electrical Engineering 101: Everything You Should Have Learned in School…But Probably Didn't
Author: Darren Ashby
Course/Topic: Electrical Engineering/Circuits (Intro)
Community Comments: Really approachable for non-majors. Covers the basics with really good examples and analogies. Low Cost (~$33 new). Definitely agree that this is very approachable and takes an easy-to-understand approach to electrical engineering. I think it even relates electrical engineering concepts to other engineering principles.

Book Title: Circuit Analysis for Dummies
Author: Santiago
Course/Topic: Used as a reference for intro circuits content
Community Comments:

Entrepreneurship

Book Title: Disciplined Entrepreneurship
Author: Aulet
Course/Topic:
Community Comments:

Book Title: Commercializing Successful Biomedical Technologies

Author: Mehta
Course/Topic: Capstone/regulatory course
Community Comments: used as a resource, to build cases, not for students

Title: Keep Innovation Simple: Lead with Clarity and Focus in a World of Constant
Author: Brad Barbera
Comments: used in intro to innovation and entrepreneurship type course - good intro to innovation

Title: The Innovator's DNA: Mastering the Five Skills of Disruptive Innovator
Authors: Jeff Dyer, Hal Gregersen, Clayton M. Christensen
Comments: used in intro to innovation and entrepreneurship type course - good intro to innovation

Ethics

Book Title: Biomedical Ethics for Engineers
Author: Vallero
Course/Topic: currently used in senior design at West Chester
Community Comments: so far mixed reviews from students, but I had not actually looked at it myself

Introduction

Book Title: Biomedical Engineering
Author: Saltzmann
Course/Topic: Previously used for a 1st year course at Colorado State
Community Comments: depending on what knowledge your students come in with, some sections may be unnecessary review

Title: *Introduction to Biomedical Engineering*, 4th edition, 2017
Author: Enderle, J.D., and Bronzino, J.D.
Course:
Comments:

Title: Introduction to Biomedical Engineering
Author: Douglas A. Christensen
Course: Intro to BME course
Comments: Pro: the math level is truly introductory. Focuses on cardiovascular system. Used as a reference text, but not used for class

Book Title: Bioengineering Fundamentals
Author: Saterbak
Course/Topic: Conservation Principles
Community Comments: Doesn't flow right for me as a course textbook but **I pull problems from here**
Agreed - I don't use it for a course but I pull problems from it

Micro/Nano Technology

Book Title: Micro- and Nanoscale Fluid Mechanics: Transport in Microfluidic Devices
Author: Brian Kirby
Course/Topic: Microfluidics
Community Comments: Grad level material

Regulatory/FDA

Book Title: Medical Device Development: Regulation and Law
Author: Jonathan S Kahan
Course/Topic: capstone, regulatory course
Community Comments: as a reference only, good case studies

Book Title: Development of FDA-Regulated Medical Products
Author: Elaine Whitmore
Course/Topic: capstone, regulatory course
Community Comments: as a reference only, good case studies

Book Title: Design and Analysis of Experiments
Author: Douglas Montgomery
Course/Topic: capstone, regulatory course
Community Comments: good statistical resource as well

Book Title: Medical Device Design and Regulation
Author: Carl T. DeMarco
Course/Topic: Industrial practices/regulatory course
Community Comments:

Thermodynamics

Book Title: Fundamentals of engineering thermodynamics (9e)
Author: Moran
Course/Topic: Thermodynamics

Community Comments: It is now available as a Zybook so it should be much better and more interactive than a regular textbook.

Book Title: Biological thermodynamics
Author: Haynie
Course/Topic: Thermodynamics
Community Comments: Lacks example problems, but content wise it is suitable for bio-related examples. Very biochemistry focused. Less conventional thermodynamics.

Design/Capstone

Book Title: Introduction to Engineering Design
Author: Saterbak and Wettergreen
Comments: Introduction and practical education on how to conduct engineering design in teams on real-world projects.

Title: Biodesign: the Process of Innovating Medical Technology [resource, not required]
Author: Yock et al.
Community Comments: Very detailed - almost too much information for a year-long course, but easy to pick and choose chapters to focus on.
Must try! Everything is online: https://biodesignguide.stanford.edu/
Cool new resource library and toolkits (check out the justice, equity, diversity and inclusion one):
https://biodesignguide.stanford.edu/resource-library/
https://biodesignguide.stanford.edu/toolkit/justice-equity-diversity-and-inclusion-in-design/

Title: Medical Device Development: Regulation and Law
Author: Jonathan S Kahan
Course/Topic: capstone, regulatory course
Community Comments: as a reference only, good case studies

Title: Development of FDA-Regulated Medical Products
Author: Elaine Whitmore
Course/Topic: capstone, regulatory course

Title: Designing Engineers, An introductory text
Author: McCahan, Anderson, Kortschot, Weiss, Woodhouse
Course: sophomore design
Comments: Very different format design process book

Title: Design of Biomedical Devices and Systems
Author: Paul H. King, Richard C. Fries, Arthur T. Johnson

Title: Biomedical Engineering Design
Author: Tranquillo et al
Course: New book, planning for spring biomedical innovation course
Comment: This is exciting! Go Joe!

Title: Medical Device Design
Author: Vikki Hazelwood
Course/Topic:General BME Design with emphasis on regulatory, insurance reimbursement
Community Comments: This book is great for a graduate level course or to supplement with a more detailed design book like Biodesign (Yock). It has many specific case study examples which can make lectures and assignments more engaging.

Book Title: Medical Device Design and Regulation
Author: Carl T. DeMarco
Course/Topic: Industrial practices/regulatory course
Community Comments:

Biomedical Statistics

Title: Biostatistics: A Foundation for Analysis in the Health Sciences
Author: Wayne W. Daniel, Chad L. Cross
Course: Statistics for BME
Comments:

Reference

Title: Pathologic Basis of Disease
Author: Robbins & Cotran
Course/Topic:Pathology / Physiology
Community Comments: **Excellent reference** material for students to use in class. Not necessarily an “assigned” textbook to teach from. Has a good digital edition.

Title: Physics of the Human Body
Author: Herman
Course/Topic: Many courses at many levels for concepts and examples
Community Comments:

Title: Business Model Generation
Author: Osterwalder
Course/Topic: excellent reference for the creation of business model canvas - many excellent work examples
Community Comments:

Title: The Visual Display of Quantitative Information
Author: Tufte
Course/Topic: authoritative reference on graphing best practices
Community Comments: A beautiful book

Title: The Craft of Scientific Presentations
Author: Alley
Topic: Assertion-Evidence approach to slide creation
Comments: SO GOOD! I teach a class using this. :)

Title: Practical Electronics for Inventors
Author: Scherz
Link: https://www.amazon.com/Practical-Electronics-Inventors-Fourth-Scherz/dp/1259587541