

MECH 329

Materials for Mechanical Design

Contact Information

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Course website: www.connect.ubc.ca

Class Format

Lectures: MWF 11 - 12 am CHBE 102
Tutorials: W 1 - 2 pm CEME 1202

The class format will be three one-hour lectures each week and one one-hour tutorial session every week. These hours may be shifted to suit the needs of the course and timeline so all hours are to remain committed to this course. Students will be expected to have and to read the required textbook material. Course lecture slides shown in class will be posted either prior to or after the lectures on the course website. Lectures will contain material not covered in the textbook or on the lecture slides thus it is important to attend the lectures as your lectures notes will be important to your level of success in this course. Additional material presented (e.g. video and guest speaker) plus reference materials referred to and/or provided on the website (e.g. standards, guidelines assigned for reading) will also be considered “examinable” course material.

Assigned homework problems will be posted on the course website. These assignments will include problem numbers from the course textbook and/or other problems. Examples and problems worked out during class periods in “real-time” will not be posted on the website.

Tutorial time will be used to present example problems, show video material and other additional course material, answer student questions about the course material, and work on assignments. When additional course material (such as a lecture) will be presented in the tutorial period, an announcement will be provided

during the lecture prior to the tutorial period or an email will be sent to course registered students.

Full solutions to “selected” homework problems in the assignments will be posted on the website, while for others, only final answers (or in some cases no answers) will be provided (e.g. such as when available through required reading). Assistance from the TA will be available during the tutorial session in addressing any questions regarding the assigned problems. The TA may also be contacted at the location listed above.

Pre-requisites

MECH 221, MECH 223

Course Grading Scheme

Midterm exams (2): 20% each (Closed book)

Final Exam: 60% (Closed and open book sections) Requires assigned textbook!

Textbook

Primary Text (required):

Kenneth G. Budinski & Michael K. Budinski, *“Engineering Materials Properties and Selection”, 9th Edition*, Prentice Hall, (2010).

Other available references:

William D. Callister, Jr., *“Materials Science and Engineering An Introduction”, 7th Edition*, John Wiley & Sons, Inc., (2007).

Michael F. Ashby and David R. H. Jones, *“Engineering Materials 1” – 2nd Edition*, Butterworth Heinemann, (1997).

Michael F. Ashby, *“Materials Selection in Mechanical Design”, 2nd Edition*, Butterworth Heinemann, (2003).

Michael F. Ashby and David R. H. Jones, *“Engineering Materials 2”, 3rd Edition*, Butterworth Heinemann, 2006

Mary Anne White, *“Properties of Materials”, Oxford University Press, (1999).*

American Society of Metals Handbook series – Volumes 1-20 (available at UBC Library, and on-line).

Reading Assignments from Course Textbook (Budinski & Budinski, 9th ed.)

Week	Chap.	Topic
1-3	1	Intro; Importance of Eng. Materials; NDE
3-4	2, 3	Forming from Elements; Physical & Chem. Properties
4-5	4, (5*)	Mechanical Properties & Testing; (Tribology*)
6	6	Corrosion;
7	23	Process of Material Selection
8-9	12, 13	Steel Products; Heat Treatment of Steels
10	14	Carbon & Steel Alloys
11	16	Stainless Steels
12	19	Aluminum Alloys
13	18	Copper Alloys

Independent reading:

* on exams (not in lectures) - Chapter 5 - Tribology

Also – don't forget to read all reference materials posted on the website!

The following chapter material will not on the exam but is suggested reading)

7,8,9,10	Polymers
11	Ceramics
17	Cast Iron; Cast Steel; Powder Metallurgy
20	Specialty Metals (Ni, Zn, Ti, Mg, etc.)
21, 22	Surface Engineering; Nanomaterials

Textbook - Table of Contents

Chapter 1 The Importance of Engineering Materials

Chapter 2 Forming Engineering Materials from the Elements

Chapter 3 The Role of Chemical and Physical Properties in Engineering Materials

Chapter 4 The Role of Mechanical Properties in Engineering Materials

Chapter 5 The Role of Tribology in Engineering Materials

Chapter 6 The Role of Corrosion in Engineering Materials

Chapter 7 Principles of Polymeric Materials

Chapter 8 Polymer Families

Chapter 9 Plastic and Polymer Composite Fabrication Processes

Chapter 10 Selection of Plastic/polymeric Materials

Chapter 11 Ceramics, Cermets, Glass and Carbon Products

Chapter 12 Steel Products

Chapter 13 Heat Treatment of Steel

Chapter 14 Carbon and Alloy Steels

Chapter 15 Tool Steels

Chapter 16 Stainless Steels

Chapter 17 Cast Iron, Cast Steel and Powder Metallurgy Materials

Chapter 18 Copper and Its Alloys

Chapter 19 Aluminum and Its Alloys

Chapter 20 Nickel, Zinc, Titanium, Magnesium, and Special Use Metals

Chapter 21 Surface Engineering

Chapter 22 Nanomaterials

Chapter 23 Methodology of Material Selection