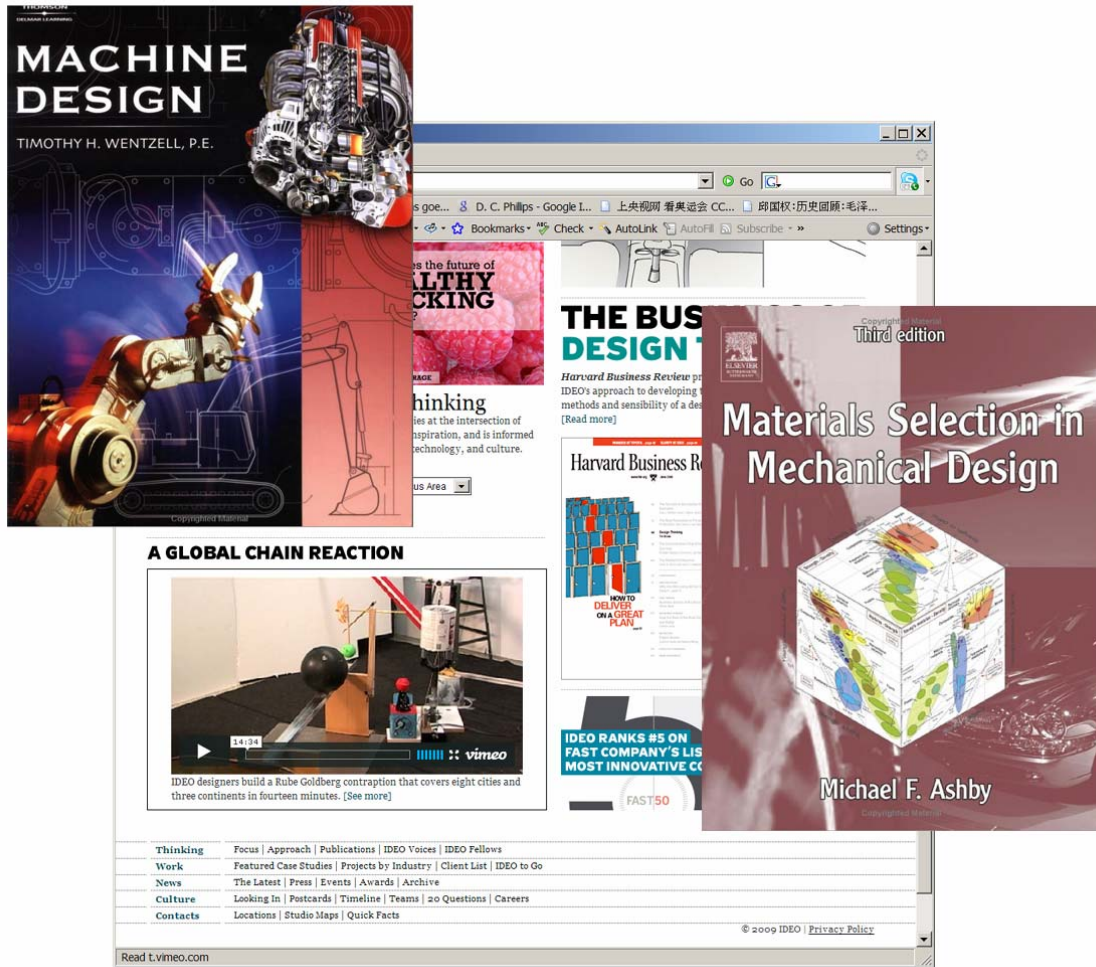


APPENDIX 1-D-1, 2, 3

Proposed New Course Syllabus



Writer:

Edward Locke

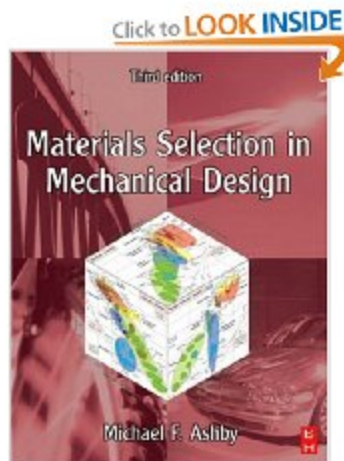
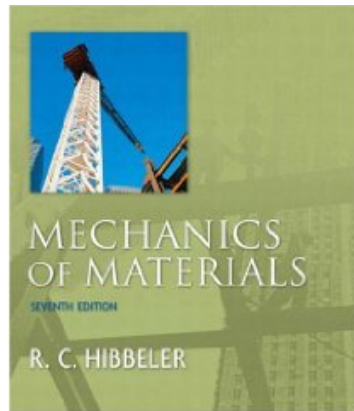
Director:

Dr. John Mativo

APPENDIX 1-D-1

ETES 5090B/7090B - Principles of Technology: Strength of Materials & Material Selection

Written by Edward Locke (edwardnlocke@yahoo.com) for
Dr. Mativo (jmativo@uga.edu)



Textbook:

- (1) Hibbeler, R. C. (2007). *Mechanics of Materials, 7th Edition*. Upper Saddle River, NJ: Prentice Hall. ISBN 10: 0132209918 or 13: 978-0132209915
- (2) Ashby, M. F. (2005). *Materials Selection in Mechanical Design, 3rd Edition*. Boston, MA: Butterworth-Heinemann. ISBN-10: 0750661682 or 13: 978-0750661683

Course Syllabus

- I. Course Purpose: To explore fundamental engineering principles and methods of strength of materials and material science, and connects class concepts and knowledge with industry-based problems.
- II. Proposed Catalog Description: ETES 5090B/7090B Principles of Technology 3 hours.
Technological literacy acquired through applied physics concepts and laws. Special emphasis on teaching the integration of mathematics, science, and technology scholarship. Topics include: Strength of Materials Part: Stress and strains under axial, shearing, and torsional forces; flexural stresses and deflections of simple beams; columns; and combined stresses. Material Selection: Types, properties, production and treatment of metals, alloys, polymers, ceramics and composites, and semiconductor materials; and

material selection and protection against deterioration. Material testing lab projects are included. This would be the second course in the Principle of Technology sequence.

- III. Prerequisites: ETES 5090A/7090A - Principles of Technology: Statics and Dynamics. High school chemistry, beginning calculus (or Math 2250 - Calculus I for Science and Engineering (Differentiation), Math 2260 - Calculus II for Science and Engineering (integration), Chemistry 1211-1211L - Freshman Chemistry I and Lab).

IV. General Course Objectives

Upon successful completion of this course, the student will:

- a. Develop a basic knowledge of strength of materials;
- b. Develop a basic knowledge of material science and material selection;
- c. Connect class concepts and knowledge with community-based problems;
- d. Integrate engineering principles of strength of materials and material science into the technology education curriculum.

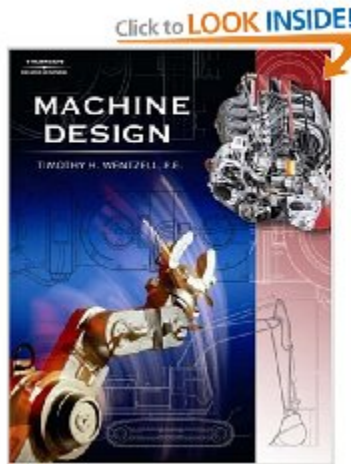
Lecture and Reading Assignment Schedule

Week	Date	Topic/Activity	Reading	Pages
Hibbeler, R. C. (2007). <i>Mechanics of Materials, 7th Edition</i>				
1	TBA	Introduction to the course	Ch 1	TBA
		Stress		
2	TBA	Stress and Strain	Ch 1, 2	TBA
3	TBA	Mechanical Properties of Materials	Ch 3	TBA
4	TBA	Axial Load	Ch 4	TBA
5	TBA	Torsion	Ch 5	TBA
6	TBA	Bending	Ch 6	TBA
7	TBA	Transverse Shear	Ch 7	TBA
8	TBA	Combined Loadings	Ch 8	TBA
9	TBA	Review for Midterm		
10	TBA	Midterm		
Ashby, M. F. (2005). <i>Materials Selection in Mechanical Design, 3rd Edition</i>				
11	TBA	The Design Process, Engineering Materials and Their Properties	Ch 1, 2, 3	TBA
12	TBA	Material Property Chart	Ch 4	TBA
13	TBA	and Material Selection	Ch 5, 6	TBA
14	TBA	Processes and Property Selection	Ch 7, 8	TBA
15	TBA	Information and Knowledge Sources for Design	Ch 15	TBA
16	TBA	Materials, Environment and Industrial Design	Ch 17, 18	TBA
17	TBA	Review for Final Exam		
18	TBA	Final Exam		

APPENDIX 1-D-2

ETES 5090E - Mechanism Design and Selection (Pre-Calculus Version)

Written by Edward Locke (elocke@uga.edu) for
Dr. Mativo (jmativo@uga.edu)



Text:

Wentzell, T. H. (2003). *Machine Design*. Clifton Park, NY: Thompson Delmar Learning. ISBN-10: 1401805175 or ISBN-13: 978-1401805173

Note:

The author of this book, Timothy H. Wentzell, P. E., is a Professor of Mechanical Engineering Technology at Three Rivers Community College and holds over 50 U.S. and foreign patents. The textbook is based on pre-calculus mathematics and thus, is one of the most suitable for K-12 Engineering and Technology Teacher Education students, as well as high school engineering students they would be teaching in the near future.

The textbook receives high remarks from editorial review, for a “straight forward introduction to machine design. A direct, logical approach strives to enhance basic understanding of the material by focusing on solving engineering design problems as opposed to working through extensive derivations. A broad collection of realistic examples and practical problems similar to those faced by working engineers encourages knowledge in the field of machine design. For this reason, the book is also usable by future and practicing engineers as a helpful reference.” (Source: http://www.amazon.com/Machine-Design-Timothy-H-Wentzell/dp/1401805175/ref=sr_1_1?ie=UTF8&s=books&qid=1230082489&sr=1-1)

Course Syllabus

- I. **Course Purpose:** To offer K-12 Engineering and Technology Teacher Education students high school appropriate analytic and predictive skills in the subject of mechanism design and selection.

- II. **Proposed Catalog Description:** ETES 5090B/7090B Principles of Technology 3 hours.
This course covers design and selection of mechanical elements and components (such as gears, pulleys, Keys and Couplings, screws, fasteners and locking devices, shafts, springs, and others), application of principles of mechanics (kinematic analysis of mechanisms, tolerance and interference, and others), properties of materials, and manufacturing processes. The emphasis is on the design of simple mechanical parts and selection of out-of-shelf mechanical elements and components in the design of products and equipments. Basic analytic formulas appropriate to high school students are covered.

- III. **Prerequisites:** ETES 5090A/7090A - Principles of Technology: Statics and Dynamics, and ETES 5090B/7090B - Principles of Technology: Strength of Materials and Material Selection.

IV. General Course Objectives

Upon successful completion of this course, the student will:

- a. Develop a basic knowledge of a variety of basic mechanical components and how their function;
- b. Develop a basic knowledge of how basic mechanical components can be used to build functional mechanical systems;
- c. Connect class concepts and knowledge with industry-based problems (such as industrial product design);
- d. Integrate engineering principles of mechanical design into the technology education curriculum.

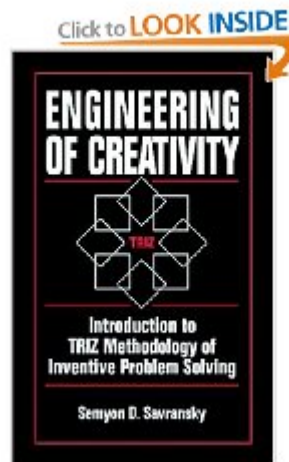
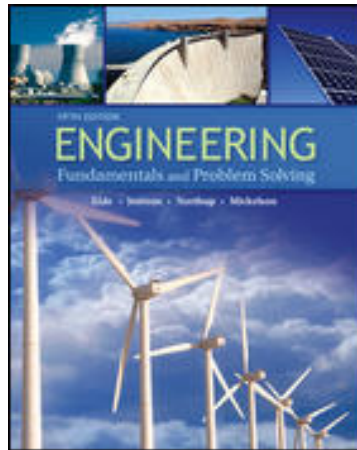
Lecture and Reading Assignment Schedule

Week	Date	Topic/Activity	Reading	Pages
1	TBA	Introduction to Mechanical Design Group Design Project assigned Review: Force, Work, and Power; Review: Stress and Deformation	Ch 1, 2, 3	TBA
2	TBA	Review: Combined Stress and Failure Theories; Review: Repeated Loading	Ch 4, 5	TBA
3	TBA	Fasteners and Fastening Methods	Ch 6	TBA
4	TBA	Impact and Energy Analysis	Ch 7	TBA
5	TBA	Spring Design	Ch 8	TBA
6	TBA	Gear Design	Ch 11	TBA
7	TBA	Spur Gear Design and Selection	Ch 12	TBA
8	TBA	Helical, Bevel and Worm Gears Review for Midterm	Ch 13	TBA
9	TBA	Midterm Belt and Chain Drives	Ch 14	TBA
10	TBA	Keys and Couplings	Ch 15	TBA
11	TBA	Clutches and Brakes	Ch 16	TBA
12	TBA	Shaft Design	Ch 17	TBA
13	TBA	Power Screws and Ball Screws	Ch 18	TBA
14	TBA	Plain Surface Bearings	Ch 19	TBA
15	TBA	Ball and Roller Bearings	Ch 20	TBA
16	TBA	The Design Process and Design Projects Completing the Group Design Project	Ch 21	TBA
17	TBA	Review for Final Exam	N/A	N/A
18	TBA	Final Exam and Presentation on Group Design Project		

APPENDIX 1-D-3

ETES 5110B/7110B – Engineering Design II

Written by Edward Locke (elocke@uga.edu) for
Dr. Mativo (jmativo@uga.edu)



Text:

(1) Eide, A. R., Jenison, R.D., L. H., & Northup, L. L. & Mikelson, S. K. (2008). *Engineering Fundamentals and Problem Solving (5th edition)*. McGraw-Hill Publishers. ISBN: 978-0-07-319158-4

(2) Savransky, S. D. (2000). *Engineering of Creativity: Introduction to TRIZ Methodology of Inventive Problem Solving*. CRC Press. LLC. ISBN: 0-8493-2255-3

Online Help link:

<http://www.ideo.com> (Engineering design ideas)

Course Syllabus

- I. Course Purpose: To offer K-12 Engineering and Technology Teacher Education students an opportunity to complete complex engineering design projects with ill-structured problems, and to prepare for a comprehensive portfolio featuring engineering design notebook, research report and CAD working drawings.
- II. Proposed Catalog Description: ETES 5110B/7110B Principles of Technology 3 hours.

This is the second class in the Capstone Engineering Design course sequence, and features complex engineering design projects with ill-structured problems. Students will complete the projects with a comprehensive portfolio featuring engineering design notebook, research report and CAD working drawings. This course continues to explore the same principles of engineering covered in ETES 5110A/7110A, but with a focus on solving ill-structured engineering design problems, connecting class concepts and knowledge with community and industry-based problems, and integrate engineering applications into the engineering and technology education curriculum.

III. Prerequisites: ETES 5110A/7110A – Engineering Design I (Applications of Engineering in Technological Studies)

IV. General Course Objectives

Upon successful completion of this course, the student will:

- a. Using the combined engineering and technology design process to solve ill-structured engineering and technology design problems.
- b. Identify and discuss the fundamentals of engineering statics, dynamics, strength of materials and material selection, mechanical design, and others.
- c. Develop engineering design strategies that integrate creativity and practicality in engineering design problems, using both out-of-shelf components and innovative designs.
- d. Produce models of engineering designed solutions to specific technological problems.
- e. Analyze engineering design solutions based on ISO 9000 design criteria
- f. Construct prototypes of engineering design solutions.
- g. Connect class concepts and knowledge with community and industry-based problems.
- h. Integrate engineering applications into the engineering and technology education curriculum.

Lecture and Reading Assignment Schedule

Week	Date	Topic/Activity	Reading	Pages
1	TBA	Introduction to the Course Review: TRIZ and green design principles Review: Engineering and Technology Design Process Review: Engineering Notebook and Portfolio Conventions	Handouts	N/A
2	TBA	Internet Search: Source of Engineering Materials Source of Mechanical Components and Systems Source Manufacturing Plant	Handouts	N/A
3	TBA	Internet Search: Engineering Design Firms Engineering Research and Educational Institutions	Handouts	N/A
4	TBA	1 st Engineering Design Group Project Assigned: Multifunctional Food Cooker	Handouts	N/A
5 - 9	TBA	Working on 1 st Engineering Design Group Project Under Instructor supervision	N/A	
10	TBA	Student Presentation and critique: 1 st Engineering Design Group Project	N/A	N/A
11	TBA	2 nd Engineering Design Group Project Assigned: Multifunctional Food Processor	N/A	N/A
12 - 16	TBA	Working on 2 nd Engineering Design Group Project Under Instructor supervision	N/A	N/A
17	TBA	Student Presentation and critique: 2 nd Engineering Design Group Project	N/A	N/A
18	TBA	Electronic and hardcopy portfolios due. Final Review.	N/A	N/A