SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

Sault College

COURSE OUTLINE

COURSE TITLE:	Materials and Fasteners		
CODE NO. :	MCH 134	**SEMESTER:**	
PROGRAM:	Mechanical Techniques		
AUTHOR:	Dennis Clement-Socchia		
DATE:	May 2003	**PREVIOUS OUTLINE DATED:**	N/A
APPROVED:			
	_____		_____
	DEAN		**DATE**
TOTAL CREDITS:	2		
PREREQUISITE(S):	None		
HOURS/WEEK:	2		

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For additional information, please contact Colin Kirkwood, Dean
School of Technology, Skilled Trades & Natural Resources
(705) 759-2554, Ext.688

I. COURSE DESCRIPTION:

To provide students with a working knowledge of the theory behind the procedures that is used in the heat treating and machining of carbon steels, aluminum and its alloys. Practical lab / shop activities will be used to enhance and / or demonstrate theoretical concepts where possible.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. ***Crystalline Structure of Metals***

Potential Elements of the Performance:

- Define and describe the term 'crystalline structure'
- Describe crystalline lattice structures at their atomic level
- Describe the crystalline structure of pure metals
- Describe the crystalline structure of alloys
- List common alloying elements for both steel and aluminum
- Describe the various stages of the solidification process of a metal
- Describe the various changes in crystalline structure and grain size of a metal as it solidifies
- Describe how mechanical properties are affected by crystalline structure and grain size

2. ***Mechanical Properties of Metals***

Potential Elements of the Performance:

- Define and describe each of the following mechanical properties and / or terms:
  - Elasticity
  - Yield Point / Strength
  - Tensile Strength
  - Ductility
  - Malleability
  - Hardness
- Describe purpose and effects of the following alloying elements upon the mechanical properties and machining characteristics of a metal
  - Carbon
  - Sulphur - Phosphorous
  - Silicon - Manganese - Copper

3. ***Basic Heat Treatment of Carbon Steels and Aluminums***

Potential Elements of the Performance:

- Explain the concepts behind the 'Solid Solution' theory
- Define and describe the following terms:
  - Lower Critical Temperature
  - Upper Critical Temperature
  - Solidification
  - Melting
  - Grain Refinement
  - Grain Growth
- Explain each of the following heat treatment processes by means of a Time – Temperature graph
  - Solid Solution
  - Anneal
  - Normalize
  - Quench
  - Temper Precipitation
  - Precipitation Hardening
  - Age Hardening
- Describe the effect on mechanical properties for each of the above heat treating processes

4. ***Bolts, Fasteners and Gasket Materials***

Potential Elements of the Performance:

- Identify the types, applications and qualities of fasteners including
  - Unified - American - National - Acme
  - Metric and Pipe thread systems
- Identify and select bolts, nuts, clips, chemical fasteners and adhesives as well as their potential use and application
- Identify and describe typical uses for such materials as
  - rubber
  - plastic
  - nylon
- Describe methods of securing machinery and components using bolts, anchors, fasteners, grouting and epoxy resins

III. TOPICS:

1. Crystalline Structure of Metals
2. Mechanical Properties of Metals
3. Heat Treatment of Carbon Steels and Aluminums
4. Bolts, Fasteners and Gasket Materials

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Text ---------- TBA
Impact Resistant Safety Glasses (CSA Approved)
High Cut (8 inch) Work Boots (CSA Approved)
Welding Gloves (CSA Approved)

V. EVALUATION PROCESS/GRADING SYSTEM:

<give breakdown of tests/assignments and their weights relative to calculating the final grade for the course>

The following semester grades will be assigned to students in other than post-secondary courses:

Grade	Definition	Grade Point Equivalent
A+	90 - 100%	4.00
A	80 - 89%	3.75
B	70 - 79%	3.00
C	60 - 69%	2.00
F (Fail)	59% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Special Needs:
If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493 so that support services can be arranged for you.

Retention of course outlines:
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:
Students should refer to the definition of "academic dishonesty" in *Student Rights and Responsibilities*. Students who engage in "academic dishonesty" will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:
The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

<include any other special notes appropriate to your course>

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean’s secretary. Students will be required to provide a transcript and course outline related to the course in question.