

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: FABRICATION and LAYOUT H

CODE NO: WLD113 SEMESTER: WINTER

PROGRAM: WELDING and FABRICATING - Techniques  
AVIATION WELDING

AUTHOR: D. SOCCHIA

DATE: fl<sub>u</sub> PREVIOUS OUTLINE DATED: Aug 94

APPROVED:  Z DEAN

MK • .^\_^/'IS  
DATE

COURSE NAME

CODE NO.

TOTAL CREDITS:

PREREQUISITE(S): Successful completion of the following semester 1 courses: Structural Blueprint Reading plus Fabrication and Layout I <OR> A combination of education and previous trade experience equal to the above.

**L PHILOSOPHY/GOALS:**

To expand upon the knowledge base and practical skills developed in Fabrication and Layout I by introducing a more advanced list of topics that involve the calculation, basic design and fabrication of industrially based components. To incorporate welding and flame cutting skills developed in the following first semester courses: Basic Shielded Metal Arc, Oxy-Fuel Gas Welding and Cutting\*.

**n. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):**

Upon successful completion of this course the student will:

- 1) Identify and select structural shapes and plate.
- 2) Cut, form and fit mild steel plate and structural steel shapes.
- 3) Learn to control distortion.
- 4) Fabricate basic structural components to industrially acceptable standards.

**HL TOPICS TO BE COVERED:**

Approximate Time

- 1) Course Introduction and Orientation
- 2) Design and Fabrication of Structural Members
- 3) Distortion Control
  - \*\*\* Assignments\*\*
  - Theory Test # 1 and Review— @ 4 weeks
- 4) Structural Bolts and Bolted Connections
  - \*\*\*Assignments\*\*\*
  - Theory Test # 2 and Review— @ 4 weeks
- 5) Design and Fabrication of Stair Stringers
  - \*\*\*Assignments\*\*\*
  - Theory Test # 3 and Review— @ 4 weeks

**IV. LEARNING ACTIVITIES/REQUIRED RESOURCES**

**Topic/Unit - # 1. Coarse Introduction and Orientation**

**Learning Activities;**

1.1 > A lecture presentation of the following major course documents:

- a) course outline
- b) course guidelines
- c) course marking system including attendance requirements

**Resources;**

> printed handouts, overheads, chalkboard notes

**Topic/Unit - #2. Design and Fabrication of Structural Members**

**Learning Activities;**

2.1 > A lecture presentation **with** classroom discussion of a typical fabrication project which may include any or **all** of the following:

- a) columns
- b) beams
- c) simple roof truss
- d) team organization and responsibilities

2.2 > A general review of personal and shop safety.

> Preparation of materials for (team) shop projects.  
(Plate, Structural Shapes and Miscellaneous Attachments )

2.3 > A lecture presentation with classroom discussion of welding distortion and residual stress to include the following major items c/w independent study assignment.

- a) expansion and contraction
- b) transverse contraction and angular distortion
- c) longitudinal expansion and contraction
- d) controlling distortion

(WIG Module # 7)

- 2.4 > A shop demonstration and review of CSA W59.1 requirements for the assembly, tackii^, welding and distortion control of components that afe felmcated by means of welding.  
> Continued jMieparatioa of materials for team (shop) projects.
- 2.5 > A lecture presentation with classroom discussion of welding distortion and residual stress to iiM:hide the following aa^oi items:
  - a) mechanical ccmtrioi of (Ustorti(m
  - b) controlling distortion by means of the weldii^ procedure  
(WIC Module # 7 )
- 2.6 > A shop demonstraticm and general review of the more common methods that may be used to control distortioiL  
> Initial assembly and fabrication of team (shop) projects.
- 2.7 > Classroom discussion and general review of welding distortion and residual stress followed by independent module reading assignment c/w review questions.  
( WIC Module # 7 )
- 2.8 > Contiaue fabrication of team (shop) projects.
- 2.9 > Completion of team (slwp) projects. Pr^wration for gradii^ of same.

**Resources:**

- > WIC Module # 7 - Weldii^ Distortion and residual Stress  
printed handouts, chalkboard notes, structural shop drawii^, mild steel plate various structural shapes.

Topic/Unit: THEORY TEST # 1 and **REVIEW**

**Resources:**

- > Test Booklets, Student Response Sheets and Grade / Answer Sheets

### TopicAJnit - # 3. Structural Bolts and Bolted Connections

#### Learning Activities:

- 3.1 > A lecture presentation with classroom discussion of the general types of forces and reactions that take place in a bolted connection.  
(chalkboard notes, printed handouts)
- 3.2 > A shop demonstration with student participation and practice of the following:  
a) calibrating a torque wrench  
b) assembling a typical bolted connection  
c) 'snugging' the installed bolts  
d) 'torquing' the previously 'snugged' bolts  
e) applying a force to the bolted connection  
f) dis-assembling the connection  
> Teams begin to fabricate components necessary for assembly of a typical bolted connection
- 3.3 > A lecture presentation on the topic of structural bolts (c/w independent study assignment) to identify and describe what is meant by:  
a) specification and grade  
b) determination of minimum hole length  
c) snugging vs torquing
- 3.4 > Teams complete fabrication of components necessary for assembly of a typical bolted connection.  
> Teams begin to assemble and snug bolted connection.
- 3.5 > A lecture presentation on the following major topics:  
a) bearing type connections  
b) slip-resistant connections  
c) the procedure for torquing bolts
- 3.7 > Completion of team (shop) projects.

#### Resources:

- >Text: 'CISC Manual'  
printed handouts, chalkboard notes, structural shop drawings, mild steel plate, various structural shapes.

Topic / Unit: THEORY TEST # 2 and REVIEW

Resources:

>Test Booklets, Stucknt Response Sheets and Grade / Answer Sheets

Topic/Unit - # 4. Design and Fabrication of Stair Stringers

Learning Activities:

- 4.1 > A lecture presentation with classroom discussion on the basic concepts of
- a) slope, angle, and number of degrees
  - b) bevel
  - c) bevel vs slope
  - d) the stair stringer as a right triangle
  - e) rise vs run
- 4.2 > A lecture presentation with classroom discussion of how to develop a simple stair stringer from essential field dimensions and typical shop calculations involving the rise / run relationship for right triangles.
- 4.3 > A shop demonstration with student participation and practice of how to:
- a) calculate the required dimensions for a simple stair stringer
  - b) lay out the designed stringer on template stock or plate
- 4.4 > A lecture presentation on the concepts of and differences between:
- a) 'fraction' as a part of a "whole number"
  - b) 'ratio' as the relationship between the 'number of parts'
  - c) 'proportion' as the relationship between two ratios said to be equal
- > A lecture presentation on the procedure for setting up and solving proportions that have one 'unknown' value.
- This is an 'OPTIONAL' Learning Activity
- 4.5 > A lecture review of 1K)W to develop a simple stair stringer from essential field dimensions and typical shop calculations involving ratio and proportion as well as the rise / run relationship for right triangles c/w homework assignment.

- 4.6 > A shop demonstration of how to simultaneously lay out two stringers using the 'as shown' and the 'opposite hand' concept  
> Team preparation of channel iron for fabrication of actual stair stringers.
- 4.7 > A lecture review of concepts and homework assignments related to:  
a) rise/run  
b) bevel  
c) ratio / proportion  
d) acceptable and unacceptable staircase bevels
- 4.8 > Completion of shop projects.

**Resources;**

- > printed handouts, chalkboard notes, assignment sheets, shop tools, template stock, mild steel plate, channel iron.

**Topic/Unit;    **THEORY TEST #3 and REVIEW**  
**(Fabrication and Layout n )****

**Resottrew;**

- > Test Booklets, Student Response Sheets and Grade / Answer Sheets

V. EVALUATION METHODS: (INCLUDES ASSIGNMENTS, ATTENDANCE REQUIREMENTS, ETC.)

General Assessment:

Final Mark:

A + - 90 to 100 %		
A = 80 to 89%		Shop Assignments 60%
B = 70 to 79%		Theory Tests 40%
C = 60 to 69%		
F/R = 0 to 59%	Attendance	••See Attached

VI. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in FABRICATION and LAYOUT- n should consult with their professor. Credit for prior learning will be given upon successful completion of the following:

1. The successful completion of a structural fabrication course with student outcomes and course topics that are at least 80% compatible with this course outline... AND
2. The successful challenge of all theory tests identified by this course outline with a resulting average mark of at least 75 %.  
<OR>
3. Written proof of at least five (5) years of competent trade experience involving the layout and fabrication of structural steel by means of welding... AND
4. The successful challenge of all theory tests identified by this course outline with a resulting average mark of at least 75 %.

Vn. REQUIRED STUDENT RESOURCES:

Work Boots (CSA Approved - steel toe and high cut)  
 Safety Glasses (CSA Approved - impact resistant)  
 Welding Gloves (CSA Approved - gauntlet type)  
 Steel Measuring Tape (16 ft c/w imperial and metric scales)  
 WIC Module # 7 Welding Distortion and Residual Stress)  
 Metal Trades Handbook  
 Scientific Calculator with Trig Ratios  
 Pencils, Pens, Notebook c/w Paper

Vn. SPECIAL NOTES:

Students with special needs (eg. Physical limitations, visual impalements, hearing impairments, learning disabilities etc.) are encouraged to discuss required accommodations confidentially with their professor.

Your professor reserves the right to modify the course as he/she deems necessary to meet the needs of students.

- Student evaluations concerning the 'Final Mark' are further affected by conditions set forth in the printed handout, "Welding Department Guidelines"
- Special Guidelines for class attendance are included in the above paper.