SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ON

COURSE OUTLINE

COURSE TITLE: WELD TESTING and INSPECTION

CODE NO: WLD119 **SEMESTER:** WINTER

PROGRAM: WELDING and FABRICATING-Techmques
AVIATION WELDING

AUTHOR: D. Socchia

DATE: **PREVIOUS OUTLINE DATED:**

APPROVED: **DEAN** **lATE** 96

Weld Testing and Inspection WLD119

COURSE NAME **CODE NO.**

TOTAL CREDTTS:

PREREQUISITE(S): Successful completion of the foUovsing semester 1 courses:
Oxy-Fuel Gas Welding and Cutting plus Basic Shielded *Metal* Arc Welding ...
<0R> a combination of education and previous trade experience equal to the above.

I. PHILOSOPHY/GOALS:

To provide students with the background and academic training necessary to inspect completed weldments for the purpose of identifying, testing and correcting the more common types of weld defects.

n. STUDENT PERFORMANCE OBJECTIVES (OUTCOMES):

Upon successful completion of this course the student \%ill:

1. Comprehend the basic requirements of CSA W59.1 that fall into the scope of this course.
2. Apply the basic requirements of CSA W59.1 to the realm of everyday welding and fabrication activities.
3. Visually inspect and measure welds for compliance to the basic requirements of CSA W59.1.
4. Organize and prepare written repons of inspection.

m. TOPICS TO BE COVERED:

	Approximate Time
1) Course Introduction and Orientation 2) Basic Mechanical Properties 3) CSA W59.1 (Basic) Requirements Independent Reading Assignments — Theory Test # 1 and Review —	12 Hours
4) (Fillet) Weld Inspection 5) (Groove) Weld Inspection Independent Reading Assignments Independent Study Assignment ~~~ Theory Test # 2 and Review ~	12 Hours

IV. LEARNING ACTIVITIES/REQUIRED RESOURCES

Topic Unit - # 1. Course 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. Basic Mechanical Properties

Learning Activities;

2.1 > A classroom/lab demonstration and lecture presentation of the following mechanical properties:

a) elasticity and elastic limit
b) yield strength
c) tensile strength
d) ductility
e) toughness
f) hardness and brittleness

2.2 > A classroom discussion and summary of the previous learning activity.
> Presentation and discussion of (Faculty) prepared definitions for each of the above mechanical properties.

2.3 > **Independent Reading Assignment** c/w instructions and review questions designed to make students:

a) List and describe the units of measurement for each of the above mechanical properties.
b) List and describe the importance of mechanical properties as they relate to weld testing and inspection.

(TEXT: Modem Welding)

Resources:

> Text: 'Modem Welding'
Printed Handouts, Overheads, Chalkboard Notes

Topic Unit - #3. CSA W59.1 (Basic) Requirements

Learning Activities:

3.1 > A lecture presentation with classroom discussion of the following W59.1 requirements for structures that are to be fabricated by welding:

a) material identification and cleanliness
b) edge preparation
c) joint fit-up prior to welding

(TEXT: CSA W59.1 and Notes)

3.2 > A second lecture presentation with classroom discussion of W59.1 requirements for structures that are to fabricated by welding to include:

a) allowable variation from design / detailed size(s)
b) control of distortion
c) identification of defects and discontinuities
d) repair of discontinuities and defects

(TEXT: CSA W59.1 and Notes)

Resources:

> Text: 'Modem Welding'
'Mathematics for Sheetmetal Fabrication'
'CSAW59.1*
Printed Handouts, Overheads, Chalkboard Notes

Topic / Unit: - THEORY TEST # 1 and REVTEW

Resources;

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

Topic Unit - #4. Fillet Weld Inspection

Learning Activities:

4.1 > Prepare a written welding procedure via computer software for the joining of identified base metals by means of a fillet weld.

4.2 > Shop demonstration and assignment dealing with the preparation and inspection of typical fiUet weld joints to include:

a) base metal dimensions
b) base metal cleaning
c) joint alignment and spacing
d) specified weld size
e) specified electrode
f) required preheat / postheat

4.3 > Shop demonstration and assignment dealing with the welding and non-destructive inspection and testing of previously prepared tee joints to include:

a) leg size
b) convexity
c) profile
d) undercut
e) porosity
f) HAZ and or weld metal cracks

Resources:

> Text: 'Modem Welding'
'Mathematics for Sheetmetal Fabrication'
'CSAW59.1'
Printed Handouts, Overheads, Chalkboard Notes

Topic Unit - #5. Groove Weld Inspection

Learning Activities:

5.1 > Prepare a written welding procedure via computer software for the joining of identified base metals by means of a groove weld.

5.2 > Shop demonstration and assignment dealing with the preparation and inspection of typical groove weld joints to include:

a) base metal dimensions
b) base metal cleaning
c) joint alignment and spacing
d) groove angle
e) specified electrode
f) required preheat / postheat

5.3 > Shop demonstration and assignment dealing with the welding and non-destructive inspection and testing of previously prepared vee-groove butt joints to include:

a) reinforcement / appearance
b) undercut
c) porosity
d) HAZ and / or weld metal cracks

5.3 > **Independent (Team) Study Assignment** c/w written informal report based upon:

a) The visual inspection of both fillet and groove welds according to a written set of standardized acceptance criteria.

b) A written record of the inspection results.

c) The preparation of a written report on the acceptance or rejection of the said welds according to the written set of standardized acceptance criteria.

Resources:

> Text: 'Modem Welding'
'Mathematics for Sheetmetal Fabrication'
'CSAW59.1'
Printed Handouts, Overheads, Chalkboard Notes

Topic / Unit: - THEORY TEST # 2 and REVTEW

Resources:

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

COURSE NAME **CODE NO.**

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

General Assessment:

A+ = 90 to 100 %
A = 80 to 89%
B = 70to 79%
C-60to 69%
F/R=50to 59%

Final Mark;

Ind_Std 40%
Theory Tests 60%

Attendance (** see attached)

VL PRIOR LEARNING ASSESSMENT:

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

1. The successful completion of a weld testing and inspection 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 and assignments identified by this course outline with a resuking average mark of at least 75 %.

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3. Written proof of at least three years of competent on- the- job experience involving the inspection and testing of welds... AND ...

4. The successfiil challenge of all theory tests and assignments identified by this course outline with a resulting average mark of at least 75 %.

Vn. REQUIRED STUDENT RESOURCES:

Texts: 'Modem Welding'
'Mathematics for Sheetmetal Fabrication
Printed Handouts for 'CSA W59.1'
Scientific Calculator

VI. SPECIAL NOTES:

Students with special needs (eg. physical limitations, visual impairments, 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 the conditions set forth in the printed handout, 'Welding Department Guidelines'.

** Special guidelines for class attendance are included in the above paper.