WELDING
PROGRAM REVIEW (2002-2006)

CERTIFICATE OF PROFICIENCY
TECHNICAL CERTIFICATE

August 2006

Prepared for:
Dr. Deborah King
Vice Chancellor for Instruction

by:
Katherine Radomski
Director of Business and Industry Training

Reviewed and Approved by:
Tracy McGraw, Dean
Division of Applied Technology & Workforce Development

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FACULTY

The certificate or degree program should have faculty necessary to accomplish its purposes.

CRITERION 1: Both full- and part-time faculty members are academically and professionally qualified and maintain expertise appropriate to their teaching responsibilities.

***RESPONSE*:** The program currently has three (3) instructors. Tim Campbell currently teaches welding primarily to Lennox Industries in Stuttgart. Mr. Campbell has an advanced welding diploma from Rice Belt Technical Institute, DeWitt, AR. He is a Certified Welder under multiple processes and procedures by the American Welding Association. Daniel Whitted is a full time instructor who teaches on both the Helena and DeWitt campuses. Greg Lloyd was an adjunct instructor with a certification in Welding from the Department of Navy and Marathon Laterno, Vicksburg, Mississippi. Mr. Lloyd resigned after the spring semester, and Donny Brown will assume adjunct welding instructor status for Fall 2006 on the Stuttgart Campus.

Phillips Community College of the U of A reviews the performance of faculty members. The evaluation process is based on two guiding principles. First is the belief that faculty evaluation must be linked with faculty development. Secondly, the evaluation process is also based on the principle that multiple sources of evidence of teaching effectiveness should be used. The faculty is evaluated each semester by students and annually by peers and division dean. Portfolios, submitted annually, document teaching effectiveness, college service, professional growth, and community service. Each portfolio is evaluated by two instructors within the division, one instructor outside the division, and by the division dean. Each section is quantified and weighted, resulting in a numerical score. A conference is scheduled at the end of the spring semester to discuss the findings.

CRITERION 2: The number and utilization of full-time and part-time faculty are appropriate to meeting the program's goals.

***RESPONSE*:** A summary of full-time and part-time faculty deployment is provided in *Appendix A—Instructor Information and Evaluations*. The Welding program is taught on all three campuses of PCCUA (Helena, Stuttgart, and DeWitt). Mr. Campbell's time is completely utilized by Lennox Industries, leaving a gap in instruction in Stuttgart that was filled by Mr. Lloyd. Mr. Whitted is splitting his time between Helena and DeWitt. As the welding program in DeWitt grows through the Career and Technical center, there may be more demand for instruction.

STUDENT OUTCOMES

The program assures a teaching and learning environment conducive to student academic achievement.

CRITERION 3: Students are provided access to support services including academic advisement and placement assistance.

***RESPONSE*:** Phillips Community College of the University of Arkansas provides a full range of student support services for students of the college and the welding program. Services provided include academic advising, testing for course placement, freshman orientation course, disability services, and placement assistance. In addition, job and career fairs are held yearly so that students will have opportunities to visit with prospective employers and gain in-depth information on careers. A placement service is provided by the college to assist graduates in communicating with employers. Instructors, the division dean, and advisory committee members are also actively involved in assisting graduates in seeking employment.

CRITERION 4: Prospective and current students are provided accurate and consistent information in the college catalog, recruitment brochures, advertisements, and student handbooks. Any admission, academic progress, graduation, grading or grievance policies specific to the program should be included.

***RESPONSE*:** The academic catalog published yearly by PCCUA provides students, staff, and advisors current information on graduation requirements, grading policy, academic calendar, tuition and fees, admission requirements, and many other items and policies of interest to students, faculty, staff, and advisors. This information, and more, is included on the PCCUA website as well. Specific information regarding the welding program is included in the PCCUA catalog and on the website. There are also specific brochures written about the program. The written college catalog is updated yearly, and the website as needed.

In addition, the implementation of syllabi templates makes specific class information available to the students and assures that syllabi information will be consistently presented to the student by adjunct and full-time instructors. Course syllabi are available on-line.

CRITERION 5: Technical Certificate and AAS degree graduates will be well prepared for entry-level positions in their field.

***RESPONSE*:** The Welding program offers three Certificates of Proficiency: Mild Steel Welding, Inert Gas Welding, and Basic Welding; and one Technical

Certificate: Welding Technology. *Figure 1* shows the graduation rates for each degree from 2002-2006.

Figure 1: Graduation rates for Welding Programs (2002-2006)

Degree	Year	Graduated
Basic Welding CP and Mild Steel Welding CP (354)	2001-2002	2
	2002-2003	7
	2003-2004	2
	2004-2005	13
	2005-2006	39
Inert Gas Welding CP (355)	2001-2002	0
	2002-2003	2
	2003-2004	1
	2004-2005	3
	2005-2006	4
Welding Technology TC (311)	2001-2002	3
	2002-2003	2
	2003-2004	1
	2004-2005	1
	2005-2006	1

The Employer Satisfaction Survey aids in determining how well PCCUA graduates are performing on the job. On this survey, employers rate PCCUA graduates' skills and knowledge in several areas. Unfortunately, the Employer Satisfaction Surveys have not been distributed for the welding program. This issue will be addressed and improved in the future. However, the division dean, business and industry trainers, and faculty members visit one-on-one with employers and Advisory Committee members to ascertain their needs and degree of satisfaction.

Of 20 surveys sent to graduates in the Welding program, three were returned (*Appendix B*). All three students expressed satisfaction with the program and with the skills they obtained. In the future, instructors or advisors will send out surveys to each graduate of the program, and follow up with non-respondents as possible to ensure higher return rates.

CRITERION 6: Technical Certificate and AAS Degree graduates will find employment in their chosen field.

***RESPONSE*:** Sources of employment for welding graduates include local welding shops, manufacturing facilities such as Industrial Ironworks in DeWitt and Lennox in Stuttgart. The Graduate Satisfaction Survey did not request information about employment. This problem should be rectified on future surveys.

CRITERION 7: AA Graduates will be able to transfer courses intended for transfer.

***RESPONSE*:** Not applicable to the welding program.

CRITERION 8: AA and AAS Degree graduates will exhibit effective reading and writing skills.

***RESPONSE*:** The TC in Welding Technology requires 3 hours of Basic Writing I or higher. This course will help students learn how to draft letters and express themselves in the writing. *Appendix C* gives graduation check sheets for the different Welding programs.

CRITERION 9: Technical certificate and associate degree graduates will have interpersonal skills needed to relate to others in a professional setting.

***RESPONSE*:** At this time, no speech requirements exist for the TC or CP in Welding.

CURRICULUM AND INSTRUCTION

The program curriculum enables it to accomplish its educational and other purposes.

CRITERION 10: The length of the program enables students to achieve program objectives and to acquire knowledge and skills necessary for employment in the field or successful transfer to a four-year college.

***RESPONSE*:** The Technical Certificate in Welding Technology is not transferable to a four-year institution under normal conditions. However, some of the specific courses may be transferable as electives and accepted by a four-year institution. The TC in Welding could, under ideal conditions, be completed in as little as one (1) academic year. The CP in Welding (15 hours) is designed to be completed in one semester, however, will most likely take one year to complete as well Students have a choice of three different CP courses of study, Inert Gas Welding, Mild Steel Welding, and Basic Welding Technology. *Appendix D* illustrates the program track information. Students are encouraged

to become certified by the American Welding Society, and are taught the skills necessary for certification and employment in the field.

CRITERION 11: The curriculum encompasses instructional materials, equipment, course and program content and method and types of instructional delivery. The program curriculum should reflect current practices in post-secondary education and in the workforce.

***RESPONSE*:** The curriculum in the TC and CP in Welding includes courses in Arc Welding, Inert Gas Welding, Pipe Welding, and Blueprint Reading. *Appendix E* gives examples of syllabi for the different welding classes.

CRITERION 12: Courses must be offered frequently enough so that students can complete the program in a reasonable period of time.

***RESPONSE*:** Due to the current employment of one (3) full-time faculty members, one of which is dedicated to Lennox employee instruction, class offerings may be limited. Helena campus welding classes are in the evening, while the DeWitt campus offers day classes. Stuttgart campus offers welding classes during the evening. *Appendix Fi* illustrates the course offerings, frequency, and the average enrollment for welding classes from 2000 through 2006.

CRITERION 13: The program's current operating budget is adequate to assure program quality.

***RESPONSE*:** The budget is adequate, and is supplemented by the Career and Technical (Secondary) Center in DeWitt.

CRITERION 14: Physical facilities are adequate to sustain the program.

***RESPONSE*:** Physical facilities are adequate to sustain the program. The Welding laboratory facilities and equipment were upgraded on the Helena campus in 2005, and space is considered adequate for instruction. There is a state of the art Welding lab on the DeWitt campus that was upgraded and moved in 1997. The Stuttgart campus has an 84 x 30 foot welding lab that was built in 2004-2005. The Stuttgart lab has air conditioning and air scrubbers.

CRITERION 15: Library resources appropriate to support the program are available and accessible to faculty and students.

***RESPONSE*:** The Lewis Library, located on the Helena campus, and maintaining satellites on the Stuttgart and the DeWitt campus contains adequate resources to support the welding program. The library sites provide on-the-shelf support and on-line resources to students in the drafting program.

CRITERION 16: Student support and staff services are available.

***RESPONSE*:** Student support and staff services are available to students in the CP and TC programs in Welding. Services include, but are not limited to:

Student Mentoring
Student Tutoring
Placement Service
Counseling and Guidance
Student Advisory Services
Learning Laboratories
Student Support Services

PROGRAM STRENGTHS

- **A** Dedicated instructors with many years of experience in design and working with students.
- **B** Adequate budget to support the program.
- **C** Strong curriculum
- **D** Adequate physical facilities
- **E** Administration is committed to program
- **F** Strong student support services

PROGRAM CONCERNS

- **A** Require graduate surveys sent to each student completing the program.
- **B** Require employer satisfaction surveys sent to each employer of PCCUA welding students on an annual basis.

RECOMMENDATION

It is recommended that the welding program stay in place on all three campuses. It is a necessary skill for a large number of employees in the service area. We recommend hiring a full time 9-month instructor that is also responsible for developing the welding program and recruiting on each campus.

Welding Technology Program Review

2006

APPENDIX - A

Instructor Information and Evaluations

Appendix A: Instructor Information

Name of Instructor	Dates employed	Degrees and Certifications
Tim Campbell Full Time Instructor	9/04/86-present	Advanced Welding Diploma, Rice Belt Technical Institute. Certified Welder under multiple processes and procedures by the American Welding Association
Daniel Whitted Full Time Instructor	8/18/03-present	
Greg Lloyd Adjunct Instructor	3/01/05-July 2006	Certified Welder, Dept. of the Navy and Marathon Laterno, Vicksburg, MS.
Bruce Downie Full Time Instructor	8/29/85 Retired 05/03	Certified Welder, Dept. of the Navy AAS, Phillips Community College U of A

Instructor Evaluations

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Fall 03																12
Always	10	12	10	11	11	10	9	7	11	9	12	10				122
Usually	2	0	2	0	1	2	1	2	1	2	0	1				14
Sometimes	0	0	0	1	0	0	2	2	0	1	0	1				7
Rarely	0	0	0	0	0	0	0	1	0	0	0	0				1
Never	0	0	0	0	0	0	0	0	0	0	0	0				0
Yes													12	12		24
No													0	0		0
Excellent															11	11
Satisfactory															1	1
Unsatisfactory															0	0

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Spring 04																8
Always	5	6	6	5	5	6	5	4	6	6	5	6				65
Usually	1	0	1	2	0	0	0	2	0	1	0	0				7
Sometimes	1	0	0	0	1	1	0	0	0	0	2	0				5
Rarely	1	1	0	1	0	0	2	1	1	0	1	0				8
Never	0	1	1	0	2	1	1	1	1	1	0	2				11
Yes													6	5		11
No													1	1		2
Excellent															7	7
Satisfactory															0	0
Unsatisfactory															1	1

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Spring 04																25
Always	23	25	23	20	21	14	23	17	23	16	22	20				247
Usually	2	0	2	5	3	11	2	5	2	8	3	5				48
Sometimes	0	0	0	0	0	0	0	2	0	1	0	0				3
Rarely	0	0	0	0	0	0	0	1	0	0	0	0				1
Never	0	0	0	0	0	0	0	0	0	0	0	0				0
Yes													24	25		49
No													0	0		0
Excellent															14	14
Satisfactory															11	11
Unsatisfactory															0	0

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Fall 04																10
Always	8	8	7	7	8	7	7	7	8	8	8	7				90
Usually			1	1		1	1	1				1				6
Sometimes												0				0
Rarely												0				0
Never	2	2	2	2	2	2	2	2	2	2	2	2				24
Yes													9	10		19
No													1	0		1
Excellent															10	10
Satisfactory																0
Unsatisfactory																0

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Fall 04																17
Always	13	15	13	13	12	11	12	10	16	13	11	15				154
Usually	4	2	4	4	5	4	4	5	1	2	6					41
Sometimes						2	1	1		2		1				7
Rarely								1								1
Never												1				1
Yes													14	17		31
No																0
Excellent															11	11
Satisfactory															5	5
Unsatisfactory																0

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Spring 05																22
Always	14	15	14	11	14	16	15	11	18	15	17	15				175
Usually	4	4	4	7	4	2	2	7		3	2	2				41
Sometimes	1		1		1		2		1	1		2				9
Rarely				1		1		1			1					4
Never	1	1	1	1	1	1	1	1	1	1		1				11
Yes													19	19		38
No																0
Excellent															15	15
Satisfactory															4	4
Unsatisfactory																0

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Fall 05																8
Always	8	8	7	7	6	8	8	7	8	8	7	7				89
Usually	1		1	0	1	0	0	0	0	0	0	1				4
Sometimes	0	0	0	1	1	0	0	0	0	0	1	0				3
Rarely	0	0	0	0	0	0	0	1	0	0	0	0				1
Never	0	0	0	0	0	0	0	0	0	0	0	0				0
Yes													8	8		16
No													0	0		0
Excellent															7	7
Satisfactory															1	1
Unsatisfactory															0	

Instructor	1.On Time	2.Prepared	3.Enthusiastic	4. Meets Objectives	5. Encourages	6. Understand	7. Test Grades	8. Provides Homework	9. Approachable	10. Informs of Progress	11. Uses Time	12. Uses types of Instruction	13. Knowledge	14. Grade Factors	15. Form Good	Totals
Fall 05																8
Always	6	8	5	5	8	6	5	7	7	8	5	4				74
Usually	2	0	3	2	0	1	2	0	1	0	3	4				18
Sometimes	0	0	0	0	0	1	0	1	0	0	0	0				2
Rarely	0	0	0	0	0	0	0	0	0	0	0	0				0
Never	0	0	0	0	0	0	1	0	0	0	0	0				1
Yes													8	8		16
No													0	0		0
Excellent															6	6
Satisfactory															2	2
Unsatisfactory															0	0

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APPENDIX - B

Graduation Survey Information

2002

Phillips COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS

GRADUATE SATISFACTION SURVEY

MAJOR: Welding Date: 6-08-06

This survey will be used in assessing our courses, instructors and in the development and planning of future courses. Circle the response that best expresses your opinion.

4=VERY SATISFIED - 3=SATISFIED - 2=DISSATISFIED - 1=VERY DISSATISFIED

1. Was the quality of instruction as a whole beneficial?	1	2	3	4
2. Did you obtain the technical knowledge and skills expected?	1	2	3	4
3. Did the Applied Technology department provide current services and resources?	1	2	3	4
4. Were your advisors for Applied Technology knowledgeable and available?	1	2	3	4
5. Did your advisor identify the courses you needed to take?	1	2	3	4
6. Did the technical track you started on remain consistent throughout your degree program?	1	2	3	4
7. Were the courses offered consistent with the course catalog?	YES			NO
8. Were you able to complete your degree program in a timely fashion?	YES			NO
9. Would you like to see a bachelor's program in your area of study?	YES			NO
10. Would you seek another degree or certification at PCCUA?	YES			NO
11. Would you recommend an Applied Technology course to a friend? Why or, why not?	YES			NO

12. Please give a review of your experience at PCCUA:
I was very satisfied with the course

2002

Phillips COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS

GRADUATE SATISFACTION SURVEY

MAJOR: Welding Date: 6-08-06

This survey will be used in assessing our courses, instructors and in the development and planning of future courses. Circle the response that best expresses your opinion.

4=VERY SATISFIED - 3=SATISFIED - 2=DISSATISFIED - 1=VERY DISSATISFIED

1. Was the quality of instruction as a whole beneficial?	1	2	3	4
2. Did you obtain the technical knowledge and skills expected?	1	2	3	4
3. Did the Applied Technology department provide current services and resources?	1	2	3	4
4. Were your advisors for Applied Technology knowledgeable and available?	1	2	3	4
5. Did your advisor identify the courses you needed to take?	1	2	3	4
6. Did the technical track you started on remain consistent throughout your degree program?	1	2	3	4
7. Were the courses offered consistent with the course catalog?	YES			NO
8. Were you able to complete your degree program in a timely fashion?	YES			NO
9. Would you like to see a bachelor's program in your area of study?	YES			NO
10. Would you seek another degree or certification at PCCUA?	YES			NO
11. Would you recommend an Applied Technology course to a friend? Why or, why not?	YES			NO

12. Please give a review of your experience at PCCUA:
I was very satisfied with the course

2024

Phillips COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS

GRADUATE SATISFACTION SURVEY

MAJOR: Inert Gas welding Date: 6-7-06

This survey will be used in assessing our courses, instructors and in the development and planning of future courses. Circle the response that best expresses your opinion.

4=VERY SATISFIED - 3=SATISFIED - 2=DISSATISFIED - 1=VERY DISSATISFIED

1. Was the quality of instruction as a whole beneficial?	1	2	3	(4)
2. Did you obtain the technical knowledge and skills expected?	1	2	3	(4)
3. Did the Applied Technology department provide current services and resources?	1	2	3	(4)
4. Were your advisors for Applied Technology knowledgeable and available?	1	2	3	(4)
5. Did your advisor identify the courses you needed to take?	1	2	3	(4)
6. Did the technical track you started on remain consistent throughout your degree program?	1	2	3	(4)
7. Were the courses offered consistent with the course catalog?	(YES)			NO
8. Were you able to complete your degree program in a timely fashion?	(YES)			NO
9. Would you like to see a bachelor's program in your area of study?	(YES)			NO
10. Would you seek another degree or certification at PCCUA?	(YES)			NO
11. Would you recommend an Applied Technology course to a friend? Why or, why not?	(YES)			NO

12. Please give a review of your experience at PCCUA:

Very Wonderful and fulfilling [signature] 6-7-06

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APPENDIX - C

Graduation Check Sheet Information

PHILLIPS COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS
GRADUATION CHECKLIST
DIVISION OF APPLIED TECHNOLOGY
CP in General Welding Techniques
Major Code: 385
Curriculum Checklist

Name _____ **Phone No.** _____

SS# _____ **Address** _____

COURSE CHECKOFF

☐ WG 115 Introduction to Welding

☐ WG 125 Arc Welding I

☐ WG 145 Inert Gas Welding I

Advisor _____ Vice Chancellor_____

Dean _____ CP WG 4-05 12-05

PHILLIPS COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS
GRADUATION CHECKLIST
DIVISION OF APPLIED TECHNOLOGY
CP in MILD STEEL WELDING
Major Code: 354
Curriculum Checklist

Name _____ **Phone No.** _____

SS# _____ **Address** _____

COURSE CHECKOFF

☐ WG 115 Introduction to Welding

☐ WG 125 Arc Welding

☐ WG 135 Arc Welding II

Advisor _____ Vice Chancellor_____

Dean _____ CP 354 WG 9-04 12-05

PHILLIPS COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS
GRADUATION CHECKLIST
DIVISION OF APPLIED TECHNOLOGY
CP in INERT GAS WELDING
Major Code: 355
Curriculum Checklist

Name _____ **Phone No.** _____

SS# _____ **Address** _____

COURSE CHECKOFF

☐ WG 115 Introduction to Welding

☐ WG 145 Inert Gas Welding

☐ WG 165 Inert Gas Welding II

Advisor _____ Vice Chancellor_____

Dean _____ CP 355 WG 9-04 12-05

PHILLIPS COMMUNITY COLLEGE OF THE UNIVERSITY OF ARKANSAS
GRADUATION CHECKLIST
DIVISION OF APPLIED TECHNOLOGY
Technical Certificate in Welding Technology
Major Code: 311
Curriculum Checklist

Name _____ **Phone No.** _____

SS# _____ **Address** _____

REQUIRED COURSES - 6 Hours

☐ EH 1013 Basic Writing I or higher
☐ MS 143 Tech Math or higher

28 Hours From within the Major
☐ WG 115 Introduction to Welding
☐ WG 125 Arc Welding
☐ WG 135 Arc Welding II
☐ WG 145 Inert Gas Welding
☐ WG 165 Inert Gas Welding II
☐ WG 155 Pipe Welding

☐ WG 133 Blueprint Reading **OR**
IT 163 Basics of Blueprints

Advisor _____ Vice Chancellor_____

Dean _____ TC 311 WG 9-04

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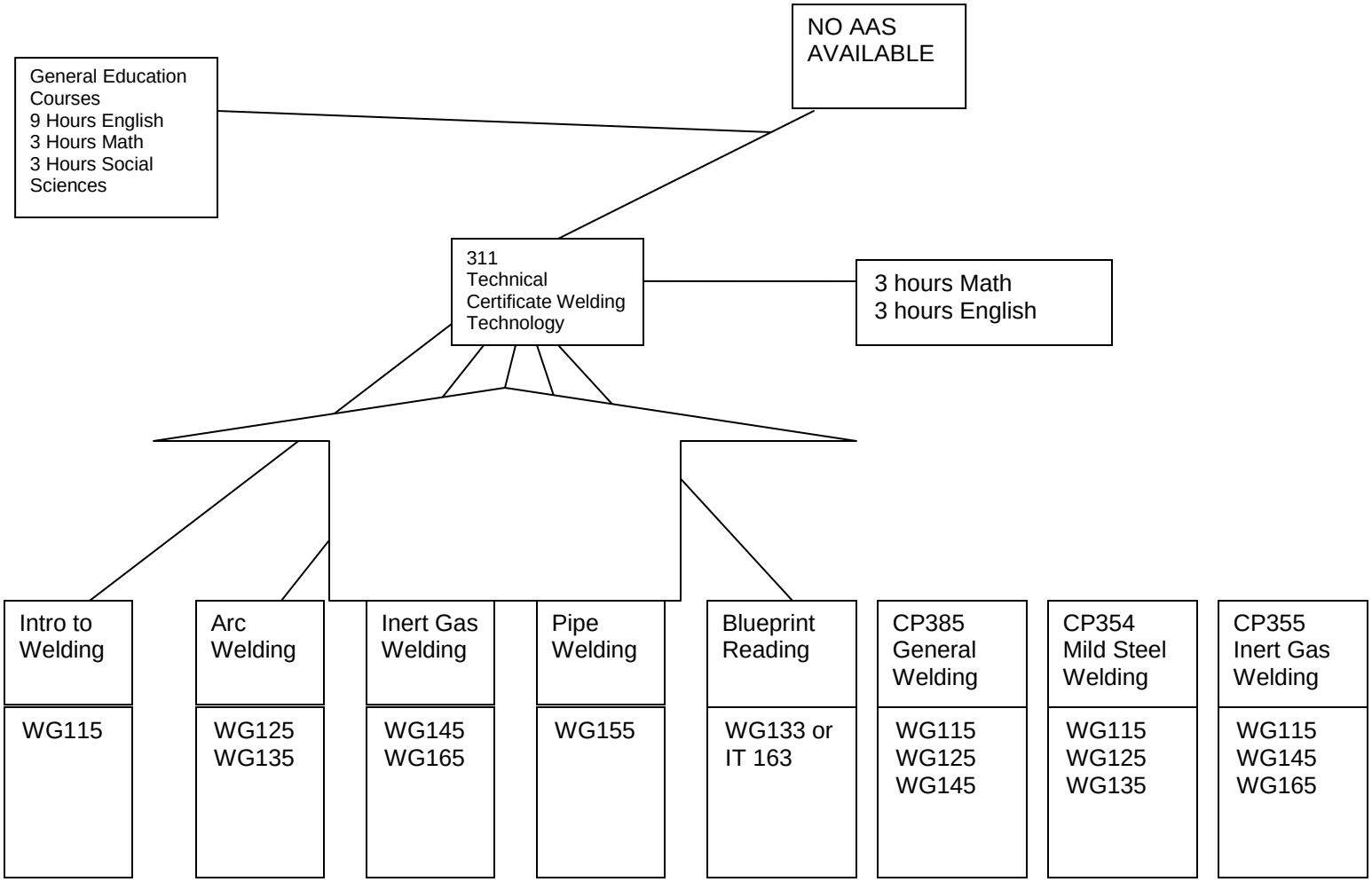
APPENDIX - D

Program Track Information

APPENDIX D – Welding Technology Degree Track



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APPENDIX - E

Syllabi Information

Phillips Community College of the University of Arkansas

Applied Technology Division

Course Title: Introduction to Welding **Credits:** 5

Course Number: WG 115 Instructors**:** T. Campbell
(1101, 1111, 1121, 1131, 1141) 1-870-946-3506 Ext. 1618

Lecture/Lab Hours Per Week: 5 total

Date of Preparation: Revised August 18, 2004

Text: Welding Skills 3rd edition
B. J. Moniz & R. T. Miller

Welding Skills Workbook 3rd edition
Jonathan F. Gosse

Additional Reading Material: Furnished by Instructor as appropriate.

Materials Required: Welding helmet with shade #10 or darker lens, leather gloves, leather cape and bib, chipping hammer, wire brush, tape measure, soap stone, pliers, cutting goggles, ear plugs, safety glasses, welders skull cap, paper & pencil/pen (**Absolutely NO red/pink ink**).

Course Description: This is the study of the theory and application of basic Shielded Metal Arc Welding, Gas Metal Arc Welding, Gas Tungsten Arc Welding and Oxy-Fuel Cutting. This course will include the setting of equipment, selecting electrodes, running beads in the flat position along with covering the principles and procedures for flame cutting processes including: oxy-acetylene cutting, plasma cutting, exothermic cutting, air carbon arc cutting, correct handling of cutting equipment and safe shop practices.

Prerequisite: None

Assignments: Assignments will be made prior to lectures and the student should be prepared for discussion in the classroom. All homework assignments are due on time. When the student completes each lab assignment he/she will bring the specimen to the instructor for evaluation and check off on the competency profile.

Each student will be responsible in helping clean the lab area.

Objectives:
By the end of this course the student will be able to:

A. List five safety rules for handling oxyacetylene welding/cutting equipment.
B. Identify oxyacetylene welding/cutting equipment.
C. Demonstrate safety for handling various cutting equipment.
D. Name two factors that determine tip size in oxy-fuel cutting.
E. Identify three types of oxyacetylene welding/cutting flames.
F. Demonstrate use of various sizes and types of cutting tips based on metal thickness.
G. Make a 90 degree cut on mild steel, stainless steel and aluminum.
H. Cut a hole in mild steel, stainless steel and aluminum.
I. Make a beveled cut on mild steel, stainless steel and aluminum.
J. Perform back gouging technique.
K. SMAW stringer bead overlay, weave bead overlay, lap joint, tee joint, corner joint and single vee butt joint in the flat position.

L. List five properties of a good weld.
M. Set up power supply for Mig.
N. Set up wire feeder for Mig.
O. Select and install wire (electrode).
P. Select/adjust current and gas.
Q. Demonstrate GMAW push/pull stringer bead overlay, weave bead overlay, lap and tee joint in the flat position.
R. Set up variable voltage power supply for AC and DC Tig welding.
S. Select and prepare electrode for Tig.
T. Select proper filler metal.
U. Demonstrate GTAW stringer bead, lap joint, tee joint and corner joint in the flat position.

Electrodes used in each process may be one or a combination of the following.
SMAW 1/8", E-7018, E-6010
GMAW .035", .045", ER70S-6, ER308L-Hi Silicon
GTAW 3/32", EWTh-2
Filler rod for GTAW 1/16", 3/32", ER70S-2, ER308L

Additional objectives will be listed on handouts as appropriate.

The objectives will be achieved through a combination of written & listening experiences, performance tests along with observation on a daily basis.

The instructor reserves the right to make curriculum changes.

Content:

A. Safety

B. History

1. Development
2. Types of welding processes

C. Equipment

1. Shielded metal arc
2. Gas metal arc
3. Gas tungsten arc

D. Special Cutting Processes

1. Oxy-fuel cutting
2. Plasma
3. Air carbon-arc cutting
4. Exothermic cutting

Evaluation: Examinations 90% of grade. Quizzes, worksheets, class participation equal 10% of grade. Lab grade will consist of A, B, C, D or F for quality of welds.

Written exams and quizzes will contain short answer, fill in the blank, multiple choice, matching, true and false an/or essay type questions. Lab tests will consist of visual and destructive examinations.

Pop tests/quizzes **CANNOT** be made up and a grade of **ZERO** is recorded.

Total grade will consist of 90% lab, 10% lectures.

Students are responsible for all assignments covered during their absence in addition to keeping up with current assignments. Students are responsible for seeing instructor to set up a make-up schedule. All make up tests will be completed by the last day of the grading period (mid-term or semester) or it becomes a zero. Each lab assignment not completed by the end of the grading period will receive an F.

All welding supplies are to be used efficiently.

Grading Scale: A 100-90, B 89-80, C 79-70, D 69-60, F 59-0

Attendance: Students are expected to attend classes. Students becoming excessively absent will receive an EW as stated in the college catalog (2 absences).

Punctuality: Tardiness will not be tolerated -- Students are expected to arrive at their classroom/lab prior to the beginning of classroom/lab activities. Any student entering the classroom/lab after the class roll has been called will be considered absent. There is one exception to this rule: Students who have been held over by their instructors. All students will stay in their assigned area(s).

Cellular phones will not be permitted in class. TURN THEM OFF!

Course Calendar Intro to Welding WG 115

This schedule is tentative and scheduled to change.

Development of the Welding Processes Types of Welding Processes Selection of the Proper Welding Processes	Chapter 1 Week of 8/30/04
Safety Accidents Ventilation Personal Protective Equipment Hazardous Substance Containers Material Safety Data Sheets Electromagnetic Spectrum (Welding Rays) Fires	Chapter 2 Week of 9/6/04
Welding Terminology A.W.S. Welding Positions Welding Location Weld Joints Weld Types Joint Selection Joint Geometry	Chapter 3 Week of 9/13/04
Oxygen Acetylene & Alternate Fuels Protective Equipment Flash Arrestors Check Valves Cylinders Torches Welding/Cutting Tips	Chapter 4 Weeks of 9/20/04 & 10/1/04

Regulators
Welding – Oxy-Fuel Equipment
Special Gas Welding Processes

Assembling the Welding/Cutting Outfits — Chapter 5
Set Up & Operation — Week of 10/4/04
Acetylene Flames
Backfire/Flashback
Flames (control)

Oxy-Fuel Gas Cutting (OFC) — Chapter 25
Pressures — Weeks of 10/11/04 thru
10/22/04
Gases
Cast Iron
Plasma Arc Cutting
Air Carbon Arc Gouging
Exothermic Cutting
Washing
Safety Precautions

Electrical Terms — Chapters 8, 10 & 11
Welding Current – AC/DC — Weeks of 10/25/04 thru
11/26/04
Welding Machines
Classification of Machines
Personal Equipment
Shop Equipment
Ventilation
Machine Settings
Proper Arc Lengths
Electrode Angles (Work & Travel)
Travel Speed
Proper & Improper Beads
Checking & Adjusting Equipment
Electrode Holder (Stinger)
Adjusting Amperage
Crater Formation
Undercutting & Overlapping
Weld Cleaning
Electrode Selection & Angle
Crater Formation
Restarting an Arc
Weave Patterns
Surfacing (Padding)
Arc Blow

Review for semester tests — Week of 11/29/04

Lab clean up — Week of 11/29/04

Semester Final Exams — December 7, 8, 9, 10 & 13

Welding Lab Competencies

Flat Position SMAW

Stringer bead overlay pad 7018
Stringer bead overlay pad 6010
Weave bead overlap pad 7018
Weave bead overlap pad 6010
Lap joint 7018
Lap joint 6010
Tee joint multi-pass 7018
Tee joint multi-pass 6010
1G & test 7018

Flat Position GMAW, short circuit, spray & pulse transfer
Stringer bead overlay pad push/drag
Stringer weave bead overlay pad push/drag
Lap joint push/drag
Tee joint multi-pass push/drag

Oxy-Acetylene Cutting
¼" plate straight cut
3/8" plate straight cut
3/8" plate 45 degree bevel
3/8" plate circles

Flat Position GTAW, mild steel
Pad ER70S-2
Lap joint ER70S-2
Tee joint ER70S-2
Corner joint ER70S-2

Plasma Cutting

Exothermic Cutting

Air-Carbon-Arc-Cutting

Classroom Behavior & Course Syllabus

Students are reminded that this is a college course. Therefore, students are expected to behave in an appropriate manner. **Disruptive, offensive, rude, inconsiderate and/or disrespectful behavior will not be tolerated at any time.** Students who choose to behave inappropriately will be asked to leave and they will not be allowed to return without permission from the proper administrators. Determination of inappropriate behavior is subject to the determination of the instructor. Some examples of inappropriate behavior include the use of offensive language, excessive talking to or bothering others, aggressive behavior, disrespect for others, destruction to college property, stealing of college property, etc. Listed above are only examples and do not include the entire spectrum of inappropriate behavior.

I acknowledge that I have received a copy of the course syllabus for this class and that I fully understand the content and will abide by its rules and regulations.

Course Title: Intro to Welding Course Number: WG 115

_____ _____
Name (Print) Signature

_____
Date

Phillips Community College of the University of Arkansas

Applied Technology Division

Course Title: Inert Gas Welding I **Instructor:** Daniel Whitted
1-870-946-3506 Ext. 1618

Course Number: WG 145 **Credits:** 5

Lecture/Lab Hours Per Week: 5 total

Date of Preparation: Revised June 20, 2005

Text: Welding Skills 3rd edition
R. T. Miller & B. J. Moniz

Welding Skills Workbook 3rd edition
Jonathan F. Gosse

Additional Reading Material: Furnished by Instructor as appropriate.

Materials Required: Welding helmet with shade #10 or darker lens, leather gloves, leather cape and bib, chipping hammer, wire brush, tape measure, soap stone, pliers, cutting goggles, ear plugs, safety glasses, welders skull cap, paper & pencil/pen (**Absolutely NO red/pink ink**).

Course Description: This course provides instruction and practical application in Gas Tungsten Arc Welding (TIG) and Gas Metal Arc Welding (MIG).

Prerequisite: WG 115

Rational: Due to the demand for certified welders, students should be prepared to understand the theory and application of all types of welding processes as well as certifying in as many areas as possible.

Assignments: Assignments will be made prior to lectures and the student should be prepared for discussion in the classroom. All homework assignments are due on time. When the student completes each lab assignment he/she will bring the specimen to the instructor for evaluation and check off on the competency profile.

Each student will be responsible in helping clean the lab area.

Objectives:

By the end of this course the student will be able to:

A. List the advantages of the GMAW process.
B. Identify the major parts of the GMAW equipment.
C. List the factors to be considered when selecting a filler wire for the GMAW process.
D. Identify common weld mistakes with the Mig process.
E. List the characteristics of a good weld for the GMAW & GTAW process.
F. Describe the effects of electrode wire stick out on volts & amps.
G. List the advantages of the GTAW process.
H. Identify the major controls of the GTAW power supply.
I. Name two types of welding current used most often in the GTAW process.
J. Identify the six major parts of the GTAW torch.
K. Match the correct filler metal to the base metal being welded.

L. Match illustrations of poor welds with the cause of each.
M. Construct a mild steel lap joint, tee joint, corner joint and square butt joint in the horizontal, vertical and overhead positions with the gas metal arc welding process.
N. Construct a mild steel lap joint, tee joint, corner joint and square butt joint in the horizontal, vertical and overhead positions with the gas tungsten arc welding process.

Electrodes used in each process may be one or a combination of the following.
GMAW .035", .045", ER70S-6
FCAW .045", E71T-1, E71T-GS
GTAW 3/32", EWTh-2
GTAW filler rod, 1/16", 3/32", ER70S-2, ER308L

Additional objectives will be listed on handouts as appropriate.

The objectives will be achieved through a combination of written & listening experiences, performance tests along with observation on a daily basis.

The instructor reserves the right to make curriculum changes.

Content:

A. Principles of GMAW, FCAW and GTAW

1. Terms & definitions
2. Advantages of GMAW, FCAW & GTAW
3. Disadvantages of GTAW
4. Major parts of GMAW, FCAW & GTAW equipment
5. Applications of the Mig, Tig and Flux Core processes
6. Factors in selecting filler wire
7. Shielding gases and their uses
8. Common weld mistakes
9. Types of power sources
10. Characteristics of a good weld

Evaluation: Examinations 90% of grade. Quizzes, worksheets, class participation equal 10% of grade. Lab grade will consist of A, B, C, D or F for quality of welds.

Written exams and quizzes will contain short answer, fill in the blank, multiple choice, matching, true and false an/or essay type questions. Lab tests will consist of visual, destructive and nondestructive tests.

Pop test/quizzes **CANNOT** be made up and a grade of **ZERO** is recorded.

Total grade will consist of 90% lab, 10% lectures.

Students are responsible for all assignments covered during their absence in addition to keeping up with current assignments. Students are responsible for seeing instructor to set up a make-up schedule. All make up tests will be completed by the last day of the grading period (mid-term or semester) or it becomes a zero. Each lab assignment not completed by the end of the grading period will receive an F.

Grading Scale: A 100-90, B 89-80, C 79-70, D 69-60, F 59-0

Attendance: Students are expected to attend class. Students becoming excessively absent will receive an EW as stated in the college catalog (2 absences).

Punctuality: Tardiness will not be tolerated -- Students are expected to arrive at their classroom/lab prior to the beginning of classroom/lab activities. Any student entering the classroom/lab after the class roll has been called will be considered absent. There is one exception to this rule: Students who have been held over by their instructors. All students will stay in their assigned area(s).

Cellular phones will not be permitted in class. TURN THEM OFF!

Course Calendar Inert Gas I WG 145

This schedule is tentative and scheduled to change.

Alternating Current	Chapter 16
Direct Current	Weeks One and Two
4/04Direct Current High Frequency	
Constant Current Welding Machines	
Inverter Welding Machines	
TIG Equipment	
Tungsten Electrodes	
Shielding Gases	
Filler Metals	
Pulsed TIG	
Mechanized TIG	
Gas Purge	
Weld Joint Preparation	Chapter 17
Weld Backing	Week Three
Travel Direction	
Pulsed TIG	
Classification of Aluminum	Chapter 18
Designating Aluminum & Aluminum Alloys	Weeks Four and Five
Pure Aluminum	
Aluminum Alloys Designation System	
Temper Designation	
Cast Aluminum Designation System	
Metallurgical Aspects	
Stainless Steel	
Copper & Copper Alloys	
Magnesium	
Brass & Bronze	
Monel & Inconel	
Carbon Steel	
Gas Metal Arc Welding	Chapter 19
GMAW Equipment	Weeks Six and Seven
Specific Advantages	
Constant Voltage Welding Machines	
Welding Current (Polarity)	
Amperage & Voltage	
Electrodes	
Shielding Gases	
Gas Flow & Regulators	
Slope	

Types of Metal Transfer
Short Circuit (Short Arc)
Globular
Spray
Pulse
Rotary Arc
Surface Tension Transfer (STT)
Hard Facing (Surfacing)

Joint Preparation	Chapter 20
Weld Discontinuities	Weeks Eight and nine
Cold Lap	
Porosity	
Crater Porosity & Cracks	
Insufficient Penetration	
Excessive Penetration	
Whiskers	
Lab clean up	Week Fifteen

Welding Lab Competencies

Horizontal Position GMAW, short circuit transfer

Stringer bead overlay pad push/drag
Lap joint push/drag
Tee joint multi-pass push/drag

Vertical Down Position GMAW, short circuit transfer

Stringer bead overlay pad
Weave bead overlay pad
Lap joint
Tee joint multi-pass

Vertical Up Position GMAW, short circuit transfer

Stringer bead overlay pad
Weave bead overlay pad
Lap joint
Tee joint multi-pass

Overhead Position GMAW, short circuit transfer

Stringer bead overlay push/drag
Weave bead overlay pad push/drag
Lap joint push/drag
Tee joint multi-pass push/drag

Horizontal Position GTAW, mild/stainless steel

Pad ER70S-2/ER308
Lap joint ER70S-2/ER308
Tee joint single pass ER70S-2/ER308

Vertical Down Position mild/stainless steel

Pad ER70S-2/ER308L
Lap joint ER70S-2/ER308L
Tee joint single pass ER70S-2/ER308L

Vertical Up Position mild/stainless steel

Pad ER70S-2/ER308L
Lap joint ER70S-2/ER308L
Tee joint single pass ER70S-2/ER308L

Overhead Position mild/stainless steel

Pad ER70S-2/ER308L
Lap joint ER70S-2/ER308L
Tee joint single pass ER70S-2/ER308L

Classroom Behavior & Course Syllabus

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I acknowledge that I have received a copy of the course syllabus for this class and that I fully understand the content and will abide by its rules and regulations.

Course Title: Inert Gas Welding I Course Number: WG 145

_____ _____
Name (Print) Signature

_____
Date

Welding Technology Program Review

2006

APPENDIX - F

Enrollment Information

APPLIED TECHNOLOGY ENROLLMENT FOR WELDIN G COURSES 2000-2005 – NO=Not Offered

Code	Title	Instructor	2000 DeWitt	2000 Helena	2000 Stuttgart	2001 DeWitt	2001 Helena	2001 Stuttgart	2002 DeWitt	2002 Helena	2002 Stuttgart	2003 DeWitt	2003 Helena	2003 Stuttgart	2004 DeWitt	2004 Helena	2004 Stuttgart	2005 DeWitt	2005 Helena	2005 Stuttgart	Avg. Enrollment for Last 5 Academic Years	Frequency of Offering in Semesters	Semester/Year Last Offered
WG 100	Intro Welding	Campbell	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 102	Job Orientation		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 104	Metal Fabrication	Downie	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 115	Intro to Welding	Campbell Whitted/Downie	12	18	NO	NO	9	NO	13	17	NO	6	28	NO	18	13	NO	30	16	9	15.75	12	Fall 05
WG 125	Arc Welding I	Campbell Whitted/Downie	4	9	NO	7	NO	NO	8	6	NO	3	16	NO	13	3	NO	21	3	NO	8.45455	11	Fall 05
WG 131	Refresher Welding Radiology		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 133	Welding Blueprint Reading	Whitted/Downie	NO	0	NO	NO	NO	NO	NO	8	NO	NO	12	NO	NO	NO	NO	NO	13	NO	8.25	4	Fall 05
WG 134	Oxy Welding Cut I	Downie	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 135	Arc Welding II Arc Welding II WAS WG124	Campbell Whitted/Downie	0	3	NO	NO	7	NO	4	7	NO	1	10	NO	NO	8	NO	NO	2	NO	4.66667	9	Fall 05
WG 144	Oxy Welding Cut II	Downie	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 145	Inert Gas Welding Inert Gas Welding ALSO WG 184	Campbell Whitted	NO	4	NO	0	7	NO	3	17	NO	1	14	NO	9	10	NO	3	5	NO	6.63636	11	Fall 05
WG 155	Pipe Welding	Whitted	NO	0	NO	NO	5	NO	NO	8	NO	NO	7	NO	NO	8	NO	NO	2	NO	5	6	Fall 05
WG 165	Advanced Inert Gas Welding II	Campbell Whitted	NO	8	NO	NO	NO	NO	NO	5	NO	NO	5	NO	1	2	NO	NO	3	NO	4	6	Fall 05
WG 175	Certification in Welding	Campbell/Downie	NO	9	NO	NO	1	NO	1	6	NO	1	1	NO	NO	2	NO	NO	6	NO	3.375	8	Fall 05

WG 181	Arc Welding Refresher		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 191	Arc Welding Refresher II		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 214	Advance Welding MIG	Downie	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 224	Advance Welding TIG	Downie	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1101	Intro to Welding	See WG 115	18	NO	NO	8	NO	NO	1	NO	NO	17	NO	NO	7	NO	NO	NO	NO	NO	10.2	5	Fall 04
WG 1111	Intro to Welding	See WG 115	6	NO	NO	7	NO	NO	0	NO	NO	15	NO	NO	3	NO	NO	NO	NO	NO	6.2	5	Fall 04
WG 1121	Intro to Welding	See WG 115	10	NO	NO	NO	NO	NO	0	NO	NO	15	NO	NO	2	NO	NO	NO	NO	NO	6.75	4	Fall 04
WG 1131	Intro to Welding	See WG 115	11	NO	NO	NO	NO	NO	4	NO	NO	4	NO	NO	6	NO	NO	NO	NO	NO	6.25	4	Fall 04
WG 1141	Intro to Welding	See WG 115	11	NO	NO	NO	NO	NO	4	NO	NO	3	1	NO	6	NO	NO	NO	NO	NO	5	5	Fall 04
WG 1150	Welding Lab	Campbell	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1151	Intro to Welding	See WG 115	44	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	24.5	2	Fall 01
WG 1152	Welding Workshop		18	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	10.5	2	Fall 01
WG 1153	Welding Workshop		9	NO	NO	3	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	6	2	Fall 01
WG 1154	Welding Workshop		11	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	8	2	Fall 01
WG 1155	Welding Workshop		7	NO	NO	6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	6.5	2	Fall 01
WG 1201	Arc Welding I	See WG 125	11	NO	NO	NO	NO	NO	4	NO	NO	4	NO	NO	6	NO	NO	NO	NO	NO	6.25	4	Fall 04
WG 1211	Arc Welding I	See WG 125	3	NO	NO	NO	NO	NO	1	NO	NO	2	NO	NO	2	NO	NO	NO	NO	NO	2	4	Fall 04
WG 1221	Arc Welding I	See WG 125	3	NO	NO	1	NO	NO	2	NO	NO	2	NO	NO	2	NO	NO	NO	NO	NO	2	5	Fall 04
WG 1231	Arc Welding I	See WG 125	3	NO	NO	1	NO	NO	1	NO	NO	2	NO	NO	1	NO	NO	NO	NO	NO	1.6	5	Fall 04
WG 1241	Arc Welding I	See WG 125	1	NO	NO	1	NO	NO	NO	NO	NO	1	NO	NO	1	NO	NO	NO	NO	NO	1	4	Fall 04
WG 1250	Welding Lab	Campbell	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1251	Welding Workshop		8	NO	NO	7	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	7.5	2	Fall 01

WG 1252	Welding Workshop		2	NO	NO	5	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	3.5	2	Fall 01
WG 1253	Welding Workshop		NO	NO	NO	0	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1301	Arc Welding II	See WG 135	2	NO	NO	NO	NO	NO	1	NO	NO	1	NO	NO	1	NO	NO	NO	NO	NO	NO	1.25	4	Fall 04
WG 1311	Arc Welding II	See WG 135	2	NO	NO	NO	NO	NO	1	NO	NO	1	NO	NO	NO	NO	NO	NO	NO	NO	NO	1.33333	3	Fall 03
WG 1321	Arc Welding II	See WG 135	1	NO	NO	NO	NO	NO	1	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	1	2	Fall 02
WG 1331	Arc Welding II	See WG 135	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1341	Arc Welding II	See WG 135	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1421	Inert Gas Welding	See WG 145	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1431	Inert Gas Welding	See WG 145	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1550	Pipe Welding Lab	Campbell	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1601	Advanced Inert Gas Welding II	See WG 165	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1611	Advanced Inert Gas Welding II	See WG 165	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1621	Advanced Inert Gas Welding II	See WG 165	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1641	Advanced Inert Gas Welding II	See WG 165	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1701	Certification in Welding	See WG 175	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1711	Certification in Welding	See WG 175	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1721	Certification in Welding	See WG 175	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1731	Certification in Welding	See WG 175	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?
WG 1741	Certification in Welding	See WG 175	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	0	0	?