

REQUEST FOR BOARD OF REGENTS APPROVAL

Institution Submitting Proposal: *Weber State University*

College, School or Division in Which Program Will Be Located: *College of Applied Science & Technology (COAST)*

Department(s) or Area(s) in Which Program Will Be Located: *Manufacturing and Mechanical Engineering Technology (MMET)*

Program Title: *Welding Technology Emphasis Within the B.S. in Manufacturing Engineering Technology (MfET) Degree*

Recommended Classification of Instructional Programs (CIP) Code: ____ . _____. *NA*

Certificate, Diploma and/or Degree(s) to be Awarded: *B.S. in Manufacturing Engineering Technology (MfET) With a Welding Technology Emphasis*

Proposed Beginning Date: *Fall 2004*

Institutional Signatures (as appropriate):

Department Chair

Date

Dean

Date

Chief Academic Officer

Date

President

Date

SECTION I The Request

Weber State University (WSU) seeks approval to add a welding technology emphasis to its existing Manufacturing Engineering Technology (MfET) degree program. The MfET program is one of four programs housed within the Manufacturing and Mechanical Engineering Technology Department (MMET) within the College of Applied Science and Technology (COAST). The welding technology emphasis was approved by the WSU Board of Trustees on March 9, 2004, and the Board of Regents Program Review Committee on April 4, 2004. This emphasis degree option will go into effect in fall of 2004, subsequent to Board of Regents approval.

SECTION II Program Description

Complete Program Description

The welding technology emphasis within the B.S. in MfET produces manufacturing engineering technologists with the knowledge of the latest processes and methods of welding. This emphasis is offered within the MMET Department, one of the outstanding manufacturing technology programs in the country. The MfET program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET).

The B.S. in MfET with a welding technology emphasis will prepare students for professional employment in industry by giving them fundamental knowledge and skills in a broad range of manufacturing disciplines. The knowledge and skills include process planning, tool and machine design, material selection and treatment, process automation, manufacturing resource planning, Six Sigma methods and tools in manufacturing, and lean manufacturing. State-of-the-art laboratories give the students hands-on experiences with CNC machine tools, robotics, programmable logic controllers, systems integration and the latest in a variety of CAD/CAM systems. Year-long, required senior projects have included satellites, hybrid electric vehicles and computer integrated manufacturing cells and others which help students gain confidence in their abilities while gaining additional insight and skills in both teamwork and human relations.

Purpose of the Requested Emphasis

This request to add a welding technology emphasis to our MfET curriculum is in tandem with a recent action by Utah State University (USU) to suspend enrollment in its B.S. in Welding Engineering Technology program effective June 2004. As a result of this USU decision, this proposal has three overarching purposes:

1. To provide an alternative program completion option for existing USU students, if they wish to transfer from USU
2. To provide a welding option for WSU MfET students
3. To meet current and future industry employment needs for welding engineering technologists

We have intentionally added this welding technology emphasis to our existing MfET degree as opposed to creating a stand-alone welding technology degree for two important reasons. First, this degree configuration will increase job opportunities for our students because it will produce graduates with both welding technology expertise and manufacturing knowledge and skills. Second, it will enable us to nationally accredit the welding technology emphasis, since our MfET program is currently accredited by TAC of ABET. Designing and implementing an emphasis within an already nationally accredited degree program will help us maintain program quality.

To complete the welding technology emphasis within the B.S. in MfET, students must complete 126 credits, including 45 credits of required MfET courses. Of these 45 credits, 26 credits will deal with welding technology and electrical circuits (see table in Appendix A). Graduates with a B.S. in MfET with a welding technology emphasis will be knowledgeable about the latest processes and methods of welding. Because these graduates are part of the MfET program, they will be able to demonstrate the following outcomes as prescribed by TAC of ABET for MfET programs:

1. mastery of knowledge and technical skills gained in the major
2. skills in quality assurance, process planning, scheduling, cost estimating, and project management using commercial computer applications
3. the ability to function as a member of a project team with good problem solving skills
4. technical competency in Manufacturing Engineering activities
5. effective technical communication skills, both written and oral

Institutional Readiness

WSU is well prepared to implement this welding technology emphasis within our existing MfET B.S. degree program for the following reasons.

Budget - We used an existing vacant MMET faculty position to hire one additional MfET faculty member to teach the welding technology emphasis courses. This new hire will work with two existing MfET faculty who have welding backgrounds (see Appendix C). We have sufficient program support monies (current expense, travel) to support this emphasis.

Faculty and Curriculum - Two of our existing MfET faculty have welding backgrounds and we recently hired a new faculty member with welding expertise to teach the 26 credits of required welding technology emphasis courses that have already been approved by our Faculty Senate.

Staff - We have 2.5 FTE staff currently within the MMET Department; this number is sufficient to handle the additional needs of welding technology emphasis students.

Equipment and Learning Resources - Through donations and purchases, we have the necessary equipment to offer this emphasis. Miller Electric, the premier producer of welding equipment in the United States, moved their Intermountain Training Center from USU to WSU in September

2003. By having this training center at WSU, we have access to the latest in welding equipment and the training on the use of that equipment, including four Metal Inert Gas welders, four Tungsten Inert Gas welders, three arc welders, five plasma cutters, and two engine driven welders, with an estimated value of \$250,000. Additionally, USU agreed to send us any surplus equipment that was used solely for their Welding Engineering Technology program. We have access to a broad array of learning resources available from Miller, as well as access to additional online and hard copy reference library materials to support the welding technology emphasis.

In summary, we are well-prepared to offer the welding technology emphasis. WSU faculty have traveled to USU to consult on curriculum, and to talk to their students and faculty to facilitate the transfer of USU welding students to WSU. USU faculty have visited WSU to talk to our faculty and tour our facilities. We are prepared to provide a seamless transfer of USU students into this emphasis when it is approved. We are ready to implement a high-quality, nationally-accredited welding technology emphasis within our existing MfET degree program.

Faculty

There are currently six full-time faculty teaching in the WSU MfET program. Two of these faculty have significant welding background and they will teach some of the welding courses. To fully implement this proposed emphasis, we have hired a seventh faculty member on a tenure track appointment who has appropriate welding expertise (see Appendix C). For a tenure track appointment in COAST, faculty must have a minimum of a masters degree and five years of relevant work experience. These three faculty are sufficient to teach the 26 credits of welding courses because WSU faculty are required to teach 24 credits per year.

With the addition of this one additional faculty member we have adequate staffing for the anticipated enrollment in the welding option for the first five years of the program. We will not hire adjunct, part-time, or non-tenure track faculty to teach welding technology courses. At WSU, faculty development is supported through several different types of activities including sabbaticals in local industry, attendance at workshops and conferences, seminars through our Forum for Teaching & Learning, and for our faculty who teach the welding technology courses, through the Miller Welding training center.

Staff

The MMET Department currently has one full-time technician and 1.5 FTE clerical support staff. This is adequate to support this new emphasis area for the first five years and additional support staff will not be needed.

Library and Information Resources

As noted earlier, the Miller Center allows access to the broad array of welding technology learning resources. In addition, students have access to online or paper copies of learning resources through our Stewart Library. There is also a small library and study room in the Engineering Technology (ET) building that also has a subset of these materials available for students. Through the Miller Center, the Stewart Library, and ET library, students can access the

needed technical journals, trade magazines, and manufacturing related reference materials. The MMET Department has a library representative that helps to assure our reference materials are kept current. Additionally, the department has an annual budget of approximately \$4,000 for the purchase of new reference materials.

Admission Requirements

There are no admission requirements for this emphasis beyond those required to be admitted to WSU.

Student Advisement

If students have not declared a major, they are advised by our central Academic Advisement Office. Once students declare a major, they are advised by faculty advisors within that department. Students who are pursuing a welding technology emphasis within the B.S. in MfET will be advised by one of the MfET faculty at least once each year.

Justification for Number of Credits

The B.S. in MfET requires 126 credits; this is within the Board of Regents required range of credits (120 to 126 credits).

External Review and Accreditation

Aside from the discussions that took place between WSU and USU faculty, there were no external consultants involved in the development of this proposed emphasis. We believe the WSU proposed curriculum content is identical or very similar to USU existing course content, though the course configuration may not be the same.

With the suspension of the USU program, there remain only three four-year welding programs in the United States: Ferris State University (MI), The Ohio State University (OH), and LeTourneau University (TX). The design of our welding technology emphasis curriculum is similar to that found at Ferris State or LeTourneau University (the Ohio State program is a welding engineering program - not a welding technology program - and is designed in part to prepare students for graduate school). Ferris State offers a B.S. in Welding Engineering Technology degree with approximately 20 graduates per year. Their curriculum includes courses in welding metallurgy, non-destructive testing, and quality control (courses also found in our proposed welding technology emphasis). The LeTourneau University curriculum also includes courses in welding methods, and AC and DC circuits (courses also included in our emphasis). It is important to note that LeTourneau University program is designed as a welding concentration within their B.S. in Engineering Technology; this is similar to our proposed welding technology emphasis within our B.S. in MfET.

The proposal to add the welding technology emphasis was reviewed by the MfET Program Industrial Advisory Committee. These individuals, noted below, unanimously approved the addition of this emphasis.

Ken Jensen, chair

Fresenius Medical

Bill Fitzgerald	GSC
Marcell Korach	Barnes Group
Rich Ranstrom	Rolls Royce
George Smedley	Iomega
Jim Truett	Miller Electric
Craig Trewet	Boeing
Dave Mills	Autoliv
Randy Stanger	Autoliv
Bud Garcia	Honeywell
Ed Vannimwegen	Lifetime Products
Ned Blackett	Chromalox
Todd McBride	Parker Hannifin

As was stated earlier, the MfET program is currently accredited by the TAC of ABET. Because this emphasis will be part of an already accredited degree program, we will notify ABET regarding that addition of this emphasis, once it is approved. The next MfET ABET review is scheduled for 2009-2010. There is no extra cost involved to accredit the welding emphasis separate and apart from the costs for accrediting the MfET program. Further, there are no separate welding accreditation standards within TAC of ABET; accredited engineering technology programs are required to meet the same criteria with regard to program objectives, outcomes and assessment; faculty; facilities; and institutional support. Both the chair of our MMET Department and the dean of COAST serve as TAC of ABET reviewers, and they have designed our welding technology emphasis to be in compliance with ABET accreditation standards.

Expansion of Existing Program

Enrollments in the existing WSU MfET program for the past five years are shown below.

WSU MfET Majors				
1999	2000	2001	2002	2003
101	102	145	139	140

With the addition of the welding emphasis and natural growth in the program as show above, it is anticipated that total MfET enrollments for the next five years will be as noted below. These numbers include an anticipated enrollment of 40 to 50 welding technology emphasis students per year.

WSU MfET Anticipated Majors (including welding technology emphasis students)				
2004	2005	2006	2007	2008

185	195	205	210	210
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SECTION III
Need

Program Need

USU has had a Welding Engineering Technology program with a solid enrollment for many years, as noted by their recent five-year enrollment data listed below. We intend to build upon this demonstrated need. If this emphasis is approved, some existing USU Welding Technology students may decide to transfer to WSU to complete their degree. Beyond those students, we will recruit students from both within and external to our existing pool of MfET students. It is anticipated that the enrollment in the proposed WSU welding technology emphasis will start at the level that has existed at USU over the past five years and grow as we recruit specifically for this option.

USU Welding Engineering Technology Majors				
1999	2000	2001	2002	2003
40	37	44	50	35

Labor Market Demand

Utah Employer Demand

We have information from Utah industries that this type of degree is strongly needed. The WSU MfET Industrial Advisory Committee members (see list earlier in this proposal) feel very strongly that there is solid market demand for such a program and have fully endorsed it. Welding is a fundamental manufacturing process used within their companies. A significant advantage in having a welding emphasis as part of manufacturing degree program is that students not only learn about the various types and kinds of welding processes and procedures, they learn about these in the larger context of manufacturing as a whole. It should also be noted that this program will produce graduates with expertise in the technologies needed by Hill Air Force Base, and this could be a positive factor in future BRAC evaluations. We are also aware that USU's welding graduates have been hired by other Utah companies, including Varian, Vulcraft, Hercules, Icon/Proform, Nucor, ATC Thiokol, and Boeing.

National Employer Demand

There is also a national market demand for welding graduates. With the decision of USU to suspend enrollment in their welding program, there remain only three four-year welding programs in the United States: Ferris State University (MI), The Ohio State University (OH), and LeTourneau University (TX). It is estimated that only 30% of the national demand for welding engineers is currently being met. This may be one reason why there has been a 100% placement of USU graduates in recent years in the Utah companies listed above, as well as with

national companies such as Caterpillar, Raytheon, General Dynamics, and Martin Marietta.

Student Demand

Immediate demand for this welding technology emphasis will come from the USU students enrolled in that Welding Technology program who wish to transfer to WSU to complete their degree. We are confident that by including a welding emphasis within an accredited MfET degree and by implementing a strong recruitment program, WSU student enrollments in our welding technology emphasis courses will equal or exceed the recent USU five-year enrollment data as shown earlier in this proposal.

Similar Programs

Several of the Utah College of Applied Technology (UCAT) campuses offer certificates in welding and several of the community colleges have welding programs. The main thrust of both of these types of programs is to produce welders, rather than welding technologists. A welder is one who physically does welding, either in the shop or in the field. The welding technologist is someone who determines what kind of welding processes should be used within an overall manufacturing option, often in an assembly line setting. With the decision of USU to suspend enrollment in their program, there is no four-year welding emphasis or welding major within USHE. Additionally, no other USHE institution offers either a bachelor's degree in manufacturing or in welding.

Collaboration with and Impact on Other USHE Institutions

We have had ongoing discussions with USU, subsequent to their decision to suspend enrollment in their Welding Engineering Technology. As a result of these discussions, we believe we have USU's support for this emphasis. We believe our collaborative efforts with USU could provide a smooth transition for any USU students who wish to transfer to WSU to complete a welding emphasis option.

We are aware that UCAT faculty and administrators are considering an A.A.T. degree in welding sometime in the future (2005-2007). Our proposed MfET baccalaureate degree with a welding emphasis could complement a future UCAT A.A.T. degree in welding and provide an advanced degree path for those A.A.T. graduates. If our welding technology emphasis is approved, we will collaborate with UCAT faculty on the design of their A.A.T. in welding degree to enhance course articulation and student transfer.

Benefits

By including a welding technology emphasis within our existing B.S. in MfET, we provide an additional degree completion option for WSU MfET students. We believe this option increases our students' career options and provides them with a competitive employability edge in a relatively unique job market both locally and nationally. A possible short-term benefit to USU is that this emphasis provides an alternative degree completion path for the welding students at USU. This welding technology emphasis also helps meet employment needs of Utah and IntermountainWest manufacturers, and this is of benefit to USHE.

Consistency with Institutional Mission

The proposed emphasis in welding technology in the B.S. in MfET degree program complements the WSU mission that states we must , “... meet the educational needs of Utah through roles assigned by the State Board of Regents in the liberal arts and sciences and a variety of vocations and professions.” Additionally we are designed to provide programs that, “... are designed to prepare students for immediate employment or further study, at the same time equipping them through liberal education for lifelong learning in a changing world.” The WSU COAST mission supports this insofar as COAST programs serve the citizens of Utah by preparing students for employment upon graduation and ensuring that they are productive, accountable, and responsible individuals able to function effectively in today’s workplace. The proposed B.S. in MfET with a welding technology emphasis fits very well with both the university and college mission.

SECTION IV Program and Student Assessment

NOTE: Because this welding technology emphasis is embedded within an existing degree program, the goals, standards of performance, and assessment processes for the welding technology emphasis and students are those which are already in place for the B.S. in MfET program and students.

Program Assessment

The mission of the WSU MfET program is to educate, prepare, and graduate students with a broad technical foundation along with the communication and interpersonal skills which will enable them to demonstrate professional competence within the discipline. Additionally, the MfET program strives to provide students, through a blend of theory and hands-on applications, with the knowledge and skills that will satisfy the needs of local and national industries. The MfET program has the following goals:

1. Strive to continuously improve the program relative to its stated mission.
2. Promote excellence in teaching within the program.
3. Strive to increase program enrollments by supporting the recruitment and retention activities of the department and college.
4. Strive to strengthen the relationship between the program and local industries by promoting a strong industrial advisory committee.
5. Support faculty activities such as consulting, sabbaticals and technical seminars that will keep the faculty technically current.

Program goals 1 through 4 are measured in several ways, including: graduate and employer surveys, exit interviews, and industrial advisory committee focus group feedback. Goal #5 is measured through faculty as they develop and achieve specific goals that help them maintain technical currency.

Expected Standards of Student Performance

The student competencies outcomes listed here are expected for all MfET graduates, including those who complete the welding technology emphasis courses. These outcomes are prescribed by TAC of ABET for the accreditation of MfET programs.

At the time of graduation, MfET students will be able to demonstrate:

1. mastery of knowledge and technical skills gained in the major
2. skills in quality assurance, process planning, scheduling, cost estimating, and project management using commercial computer applications
3. the ability to function as a member of a project team with good problem solving skills
4. technical competency in MfET activities.
5. effective technical communication skills, both written and oral

Student Assessment

We use several assessment methods to measure the outcomes listed above. Formative assessment measures include assignments, exams, and term projects as well as a capstone senior design project. Summative assessment methods include graduate surveys, employer surveys, and exit interviews. In addition, all MfET students are required to take the Society of Manufacturing Engineers Certification Exam. The results from this exam are used to assess whether there are weaknesses in any of the areas covered by the exam in our program.

Continued Quality Improvement

The B.S. in MfET program has been TAC of ABET accredited for more than 20 years and, as an accredited program, we are required to demonstrate that we use the results of assessment to further the development and improvement of the program. Through our ongoing outcomes assessment processes and our regular accreditation reviews, we have made many MfET program improvements over the years. Recent examples include the addition of a three-course quality series to the curriculum, and modification of our senior project process. In addition to the outcomes and accreditation-related data, we gather regular student course evaluation data on all MfET faculty (tenured, tenure-track and term). These student data have also resulted in course improvements.

SECTION V Finance

Budget

The following table summarizes the projected five-year budget for the MfET program and includes the recent hire of the faculty member with welding expertise. We hired a seventh MfET faculty member with funds attached to a vacant MMET faculty position. We believe the E&G funds that support the MfET current expense, library, and travel funds are adequate to support this new faculty hire and the anticipated 40-50 new MfET welding technology emphasis students.

Private donations have initially been adequate for the equipment needed in the first five years for this proposed emphasis. As described in the Budget Table Note #5 and earlier in this proposal, Miller Electric, a major manufacturer of welding equipment, recently relocated their Training Center for the Intermountain West from USU to WSU. As a result, we have access to the latest welding equipment including four Metal Inert Gas welders, four Tungsten Inert Gas welders, three arc welders, five plasma cutters, and two engine driven welders, with a total estimated value of \$250,000. With the strong support of our Industrial Advisory Committee for this proposed emphasis, we anticipate we will receive future donations of equipment or funds for equipment.

	2004-05	2005-06	2006-07	2007-08	2008-09
Salaries/ Wages ⁽¹⁾	\$396,788	\$404,724	\$412,818	\$421,075	\$429,496
Benefits ⁽²⁾	\$160,699	\$163,913	\$167,191	\$170,535	\$173,946
Current Expense ⁽³⁾	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Library ⁽⁴⁾	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Equipment ⁽⁵⁾	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Travel ⁽⁶⁾					
TOTAL	\$651,487	\$662,637	\$674,009	\$685,610	\$697,442

Budget Table Notes:

1. Salary - Salary figures include a 2% increase each year.
2. Benefits - Benefits are calculated at 40.5% of salaries.
3. Current Expense - This operating budget supports 7 full-time faculty and existing MfET majors; it will be adequate to support the projected 40-50 additional welding technology emphasis students.
4. Library - This reflects the MfET annual library budget; additional resources are spent by our Stewart Library to support the MfET program.
5. Equipment - Funds for equipment come from gifts and donations (vs E&G). As noted earlier in this proposal, Miller Electric relocated their Training Center from USU to WSU in September 2003, and this Center provides us with access to a wide array of welding equipment and instructional materials.
6. Travel - Travel for all faculty and staff is supported centrally from the dean's office, and the MfET allocation is adequate for the recent hire, since this position already existed within MMET.

Funding Sources

Funds to support the welding technology emphasis include E&G monies for salaries, benefits, current expense, and library. The current level of MfET E&G funds is adequate to support the welding technology emphasis students and the one additional faculty we hired to teach the emphasis courses. As noted above, donations and gifts have provided the equipment needed for the first five years of this proposed emphasis. We anticipate that future donations/gifts, as well

as grants, will support future equipment needs.

Reallocation

Because a vacant MMET faculty position was filled by an MfET hire with welding expertise, this could be construed as a reallocation of salary dollars, although this position was and remains in the MMET Department. There will be no reallocation of funds outside MMET to support this proposed emphasis.

Impact on Existing Budgets

The relocation of the Miller Center from USU to WSU could be considered a net gain in our budget because of the donated equipment and materials. The MfET E&G budget is adequate to support any additional costs accruing from the addition of the welding technology emphasis.

**Appendix A
Program Curriculum**

New Courses to be Added in the Next Five Years

Students who pursue the welding technology emphasis will take the courses in the right half of the following table, instead of courses found on the left half of the table. The MfET welding technology emphasis courses have been approved by the WSU Faculty Senate.

EXISTING MfET AND NEW MfET COURSES FOR THE WELDING TECHNOLOGY EMPHASIS			
Existing MfET Courses	Cr Hrs	New MfET Welding Technology Courses	Cr Hrs
MfET 1150 Preprofessional Seminar	1	MfET 2670 Gas Metal Arc, FluxCore Arc, & Gas Tungsten Arc Welding	3
MfET 2440/L CNC in Manufacturing	3	MfET 3060 Codes, Welding Inspection, & Quality Assurance	3
MfET 3010 Tool Design	3	MfET 3630 Fusion Joining & Brazing	3
MfET 3310/L Material Selection/Heat Treatment	3	MfET 3750/L Welding Metallurgy I	3
MfET 3320 Machine Design	2	MfET 3760/L Welding Metallurgy II	3
MfET 3340/L Applied Fluid Power	3	MfET 3820 Nondestructive Testing	3
MfET 3350/L Plastic and Composite Manufacturing	4	MfET 4090 Power Sources	2

Existing MfET Courses	Cr Hrs	New MfET Welding Technology Courses	Cr Hrs
MfET 3610/L Machining Principles II	3	MfET 4310 Corrosion	2
MfET 3710/L Computer-Aided Manufacturing and Rapid Prototyping	3	CEET 1140 AC and DC circuits	4
Total non-Welding Credits	25	Total Welding Credits	26

All Program Courses - by General Education, Core, and Elective.

General Education

Course Number	Title	Cr. Hrs.
EN1010	Introduction to Writing	3
EN2010	Intermediate Writing	3
QL1080	Pre-calculus	5
SI1210	Calculus	4
	Computer & Information Literacy Exam/Courses	2
SS1010	Economics as a Social Science	3
HU1050	Interpersonal and Small Group Communication	3
PS/SI2010 or 2210	General Physics	5
PS/SI1110	Elementary Chemistry	5
CA/HU	Creative Arts or Humanities/Diversity	3
AI	American Institutions	3
LS	Life Science/Diversity	3
SS	Social Science/Diversity	3
CA/HU	Creative Arts or Humanities/Diversity	3
	Total General Education Credits	48

Core Courses

Course Number	Title	Cr. Hrs.
MFET 1150	Pre-professional Seminar	1

Course Number	Title	Cr. Hrs.
MFET 1210/L	Machining Processes 1	3
MFET 2150/L	Metal Forming, Casting & Welding	4
MFET SI2300	Statistics and Strength of Materials	5
MFET 2410	Quality Concept & Statistical Applications	3
MFET 2440/L	CNC in Manufacturing	3
MFET 2899	Associate Degree Assessment	0
CDGT 1250	Computer Aided Drafting	3
CDGT 1260	Advanced Computer Aided Drafting	3
CDGT 2450	Geometric Dimensioning & Tolerancing	2
CEET 1110	Basic Electronics	2
MFET 3320	Machine Design	2
MFET 3340/L	Applied Fluid Power	3
MFET 3350/L	Plastics & Composite Manufacutring	4
MFET 3010	Tool Design	3
MFET 3810	Statistical Process control & Reliability	3
MFET SI3310/L	Material Selection & Heat Treat	3
MFET 3910	Six Sigma Methods & Tools in Manufacturing	5
MFET 3710/L	Computer Aided Manufacturing & Rapid Prototype	3
MFET 3550	Manufacturing Supervision	3
MFET 3610/L	Machining Principles 2	3
MFET 4580/L	Process Automation	3
MFET 4610	Senior Project Planning & Estimating	5
MFET 4610L	Senior Project Lab	2
MFET 4620L	Senior Project Lab	2
MFET 4995	CMfg Exam Review	1
	Total Core Credits	74

Elective Courses

MFET	Technical Elective	3
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	Total Elective Credits	3
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Total hours for the B.S. in MfET with a Welding Technology Emphasis = 126

Appendix B

Program Schedule

The four-year suggested schedule of courses for the B.S. in MfET with a Welding Technology emphasis (126 credits) is found here:

COURSE	NAME	Cr hrs	COURSE	NAME	Cr hrs
MfET 1210/L	Machining Principles I	3	CEET 1110	Basic Electronics	2
CDGT 1250	Computer Aided Drafting	3	CDGT 1260	Advanced Computer Aided Design	3
TBE 1700 series	Computer and Information Literacy exams/courses	2	ENGL EN 2010	Intermediate Writing	3
ENGL EN1010	Introduction to Writing	3	MATH SI 1210	Calculus	4
MATH QL1080	Pre-calculus	5	CHEM PS/SI 1110	Elementary Chemistry	5
FALL SEMESTER - FIRST YEAR		Total 16	SPRING SEMESTER - FIRST YEAR		Total 17
MfET 2150/L	Metal Forming, Casting and Welding	4	MfET SI 2300	Statics and Strength of Materials	5
CDGT 2450	Geometric Dimensioning & Tolerancing	2	MfET SI 2410	Quality Concepts and Statistical Applications	3
COMM HU1050	Intro to Interpersonal Communication	3	CEET 1140	AC and DC Circuits	4
ECON SS1010	Economics as a Social Science	3	HU	Creative Arts or Humanities Elective	3
PHSX PS/SI 2010 or 2210	General Physics	5			
FALL SEMESTER - SECOND YEAR		Total 17	SPRING SEMESTER - SECOND YEAR		Total 15
MfET 2670	Gas Metal Arc, Flux Core Arc, & Gas Tungsten Arc Welding	3	MfET 3630/L	Fusion Joining & Brazing	3
MfET 3060	Codes, Weld Inspection & Quality Assurance	3	MfET 3910	Six Sigma Methods and Tools in Manufacturing	5
MfET 3750/L	Welding Metallurgy I	3	MfET 3820	Nondestructive Testing	3

COURSE	NAME	Cr hrs	COURSE	NAME	Cr hrs
MfET 3810	Statistical Process Control and Reliability	3	MfET 3550	Manufacturing Supervision	3
MfET Elective	Technical Elective	3	MfET 3760/L	Welding Metallurgy II	3
FALL SEMESTER - THIRD YEAR Total 15			SPRING SEMESTER - THIRD YEAR Total 17		
MfET 4580/L	Process Automation	3	MfET 4620L	Senior Project Lab	2
MfET 4610	Senior Project Production Planning and Estimating	5	MfET 4090	Power Sources	2
MfET 4610L	Senior Project Lab	2	MfET 4310	Corrosion	2
HIST 1700	American Institutions	3	DV	Diversity Elective	3
LS	Life Science Elective (Suggested - Botany 1400)	3	CA/HU	Creative Arts or Humanities Elective	3
			MfET 4595	Certified Manufacturing Technologist (CmfgT) Exam Review	1
FALL SEMESTER - FOURTH YEAR Total 16			SPRING SEMESTER - FOURTH YEAR Total 13		

Appendix C Faculty

Below is a list of the current full-time MfET faculty; the three faculty with welding expertise, are noted with an asterisk.

Faculty	Degree	Yrs. Teaching Exp.	Yrs. Industry Exp.
Mark Baugh *	B.S. Economics M.S. Industrial Technology	5	5
George Comber *	A.S. Manufacturing Engineering Technology B.S. Manufacturing Engineering Technology M.S. Computer-Integrated Manufacturing	22	15
Andrew Drake	B.S. Manufacturing Engineering Technology M.S. Systems Management	13	24
Kelly Harward	B.S. Design Engineering Technology MS. Manufacturing Engineering Technology	16	25
Robert Milner	A.A.S. Manufacturing Engineering Technology A.A.S. Design Graphics B.S. Integrated Studies M.S. Industrial Technology	23	30

Faculty	Degree	Yrs. Teaching Exp.	Yrs. Industry Exp.
Rick Orr	B.S. Mechanical Engineering M.S. Engineering Administration M.S. Management Technology	8	26
Kerry Tobin *	B.S. Manufacturing Engineering Technology M.S. Computer Integrated Manufacturing	22	29