WSU Five-Year Program Review
Self-Study

Cover Page

Department/Program: Engineering Technology - Mechanical Engineering Technology

Semester Submitted: Spring 2015

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A. Brief Introductory Statement

This five year program review self-study is for the Mechanical Engineering Technology program which is in the Department of Engineering Technology in the College of Applied Science and Technology. The study is based upon the self-study done for ABET as the program will be undergoing reaccreditation review by ABET in 2015. It should be noted that the program provides courses for its own majors as well as service courses for the Manufacturing and Design Engineering Technology programs.

It should be noted that the program faculty are teaching very heavy loads because of the inability to hire more full-time faculty, the growth in enrollment, and the lack of qualified adjunct faculty available to teach during the day. These loads are such that they prevent the faculty from fulfilling the other aspects of their employment, namely scholarship and service.

B. Mission Statement

The mission of the Mechanical Engineering Technology Program, by adherence to the mission objectives of Weber State University and the College of Applied Science and Technology, is to provide students a high quality undergraduate education in Mechanical Engineering Technology. This education, which emphasizes mechanical engineering fundamentals bolstered by practical experiences, prepares students for engineering and technology related professions, advanced education, and lifelong learning. The program stresses applied mechanical engineering principles, laboratory testing and experimentation, computer applications of design and analysis, and the application of mathematics and the physical sciences to the solution of technological problems. A general education component enables students to deepen their awareness and understanding of the world around them, communicate effectively, become contributing members of society, and prepares them for future personal and professional growth.

C. Curriculum

Curriculum Map

I = Introduced **R = Reinforced** **E = Emphasized** Core & Support Courses in the Program	Department/Program Learning Outcomes										
	Learning Outcome 1	Learning Outcome 2	Learning Outcome 3	Learning Outcome 4	Learning Outcome 5	Learning Outcome 6	Learning Outcome 7	Learning Outcome 8	Learning Outcome 9	Learning Outcome 10	Learning Outcome 11
MET 1000 Intro to Mech Engr Tech & Des	I	I	I	I	I	I	I				
MET 1500 Mechanical Design Engr	I	I	I	R	I	I	I				
MET 2500 Modern Engineering Tech	I	I			R	R	R	I	I	I	
MET 3050 Dynamics	R										
MET 3150 Engr Tech Materials	R		R				R				
MET 3300 Comp Prog Apps in MET	R					R					
MET 3400 Machine Design	R										
MET 3500 Mech Measure & Inst	R		R			R					
MET 3700 Testing & Failure Analysis	R	R			R	R		R	R	R	
MET 4200 Mech Design with FEA	R			R		R					
MET 4500 Senior Project I	E	R	E	E	E	E	E	R	R	R	E
MET 4510 Senior Project II	E	R	E	E	E	E	E	R	R	R	E
MET 4650 Thermal Sciences	E	E									
MET 4990 Seminar in MET								E	E	E	E
DET 1010 Intro to Eng & Technical Des	I	I		I							
MFET 1210 Machining Principals	I	I					I				
MFET 2300 Statics & Strengths of Materials	R										
MFET 2360 Manufacturing Proc & Materials	R	I									

I = Introduced **R = Reinforced** **E = Emphasized** Core & Support Courses in the Program	Department/Program Learning Outcomes										
	Learning Outcome 1	Learning Outcome 2	Learning Outcome 3	Learning Outcome 4	Learning Outcome 5	Learning Outcome 6	Learning Outcome 7	Learning Outcome 8	Learning Outcome 9	Learning Outcome 10	Learning Outcome 11
MFET 3340 Applied Fluid Power	R										
EET 1850 Industrial Electronics	R										
MATH 1080 Pre-Calculus	I										
MATH 1210 Calculus I	R										
CHEM 1110 Elementary Chemistry	I										
PHYS 2210 Physics for Scientists & Engineers	I										
Technical Electives	R	R	R			R					

Summary Information (as needed)

D. Student Learning Outcomes and Assessment

Measureable Learning Outcomes

At the end of their study at WSU, students in this program will have attained:

1. The ability to apply the knowledge, techniques, skills and modern tools of the discipline, including technologies of materials, applied mechanics, computer-aided drafting/design, manufacturing processes, tooling, production operations, thermal fluid science and statistics.

2. The ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.

3. The ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.

4. The ability to apply creativity to design of systems, components and processes.

5. The ability to function effectively as a member or leader of a team.

6. An ability to demonstrate creativity in designing solutions to problems through analysis and experimentation leading to modification of systems, components and processes.

7. An ability to communicate effectively using written, oral, and graphical forms of communication.

8. A recognition of the need for and the ability to pursue lifelong learning.

9. An understanding of professional, ethical and social responsibilities.

10. A respect for diversity and a knowledge of contemporary professional, societal and global issues.

11. A commitment to quality, timeliness and continuous improvement.

Evidence of Learning: Courses within the Major

Evidence of Learning: Courses within the Major					
Measureable Learning Outcome	Method of Measurement	Threshold for Evidence of Learning	Findings Linked to Outcomes	Interpretation of Findings	Action Plan/Use of Results
1. The ability to apply the knowledge, techniques, skills and modern tools of the discipline, including technologies of materials, applied mechanics, computer-aided drafting/design, manufacturing processes, tooling, production operations, thermal fluid science and statistics	1. MET Exit Exam (Part I & II)	60% of students receiving a minimum 60% on the MET Exit Exam Part I & II.	72% of all students in the MET program have cumulatively tested above 60% for Parts I & II of the exam. (71% tested above 60% in most current exam – Spring 2014)	Acceptable level of performance to specified metric.	No action required at present. Continue testing and monitoring results.
2. The ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.	1. MET Exit Exam (Part I & II)	60% of students receiving a minimum 60% on the MET Exit Exam Part I & II.	72% of all students in the MET program have cumulatively tested above 60% for Parts I & II of the exam. (71% tested above 60% in most current exam – Spring 2014)	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.
2. (Cont)	2. Senior Project - design evaluation rubric	Minimum of 2.0 composite score based on senior project design review rubric	Cumulative composite score of 2.38 based on four different senior projects evaluated from spring 2013 to present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.

2. (Cont)	3. Student presentation and design documentation	Evaluation and approval of faculty advisor following review of submitted documentation.	Typically all project documentation has met or exceeded minimum expectations.	Acceptable level of performance to specified criteria.	No action required at present. Continue to evaluate.
3. The ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.	1. Senior Project - design evaluation rubric	Minimum of 2.0 composite score based on senior project design review rubric	Cumulative composite score of 2.38 based on four different senior projects evaluated from spring 2013 to present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.
3. (Cont)	2. Student presentation and design documentation	Evaluation and approval of faculty advisor following review of submitted documentation.	Typically all project documentation has met or exceeded minimum expectations.	Acceptable level of performance to specified criteria.	No action required at present. Continue to evaluate.
4. The ability to apply creativity to design of systems, components and processes.	1. Senior Project - design evaluation rubric	Minimum of 2.0 composite score based on senior project design review rubric	Cumulative composite score of 2.38 based on four different senior projects evaluated from spring 2013 to present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.
4. (Cont)	2. Student presentation and design documentation	Evaluation and approval of faculty advisor following review of submitted documentation.	Typically all project documentation has met or exceeded minimum expectations.	Acceptable level of performance to specified criteria.	No action required at present. Continue to evaluate.

5. The ability to function effectively as a member or leader of a team.	1. Senior Project - design evaluation rubric	Minimum of 2.0 composite score based on senior project design review rubric	Cumulative composite score of 2.38 based on four different senior projects evaluated from spring 2013 to present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.
5. (Cont)	2. Senior Project – peer and instructor evaluation review rubric	Peer & Instructor evaluation rubric average of 2.0 or higher.	Average peer rubric average of 2.77 and instructor average of 2.51 based on four evaluated senior project teams from spring 2013-present.	Acceptable level of performance to specified criteria.	No action required at present. Continue to evaluate.
6. An ability to demonstrate creativity in designing solutions to problems through analysis and experimentation leading to modification of systems, components and processes.	1. Senior Project – design evaluation rubric	Minimum of 2.0 composite score based on senior project design review rubric	Cumulative composite score of 2.38 based on four different senior projects evaluated from spring 2013 to present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.
6. (Cont)	2. Student presentation and design documentation	Evaluation and approval of faculty advisor following review of submitted documentation.	Typically all project documentation has met or exceeded minimum expectations.	Acceptable level of performance to specified criteria.	No action required at present. Continue to evaluate.

7. An ability to communicate effectively using written, oral, and graphical forms of communication.	1. Senior Project – design evaluation rubric	Minimum of 2.0 composite score based on senior project design review rubric	Cumulative composite score of 2.38 based on four different senior projects evaluated from spring 2013 to present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.
7. (Cont)	2. Student presentation and design documentation	Evaluation and approval of faculty advisor following review of submitted documentation.	Typically all project documentation has met or exceeded minimum expectations.	Acceptable level of performance to specified criteria.	No action required at present. Continue to evaluate.
8. A recognition of the need for and the ability to pursue lifelong learning.	1. Senior Project Exit Survey	50% of all survey respondents have joined or plan to join a professional society and/or attend graduate school.	New survey is pending.	New survey is pending.	New exit survey to be implemented in Spring 2015.
8. (Cont)	2. MET 4990 Coursework	90% of students with successful completion of MET 4990.	100% of all MET students successfully completed MET 4990. Spring 2012-present. Additional curriculum pending.	Planning to add additional curriculum to better cover lifelong learning.	Add specific curriculum regarding professional society membership and graduate school options to the seminar series in Spring 2016.
8. (Cont)	3. MET Exit Exam (Part III)	60% of students receiving a minimum of 60% on the MET Exit Exam Part III.	Revision to Part III of the exit exam is planned for Spring 2016	Planning to collect additional data from the Exit Exam addition.	Update Part III of the Exit Exam for Spring 2016.

9. An understanding of professional, ethical and social responsibilities.	1. MET 4990 Coursework	90% of students with successful completion of MET 4990.	100% of all MET students successfully completed MET 4990. Spring 2012-present.	Acceptable level of performance to current specified metric.	No action required at present. Continue to evaluate.
9. (Cont)	2. MET Exit Exam (Part III)	60% of students receiving a minimum of 60% on the MET Exit Exam Part III.	Part III of Exit Exam to be implemented Spring 2015.	Planning to collect additional data from Exit Exam addition.	Implement Part III of the Exit Exam.
10. A respect for diversity, and a knowledge of contemporary professional, societal, and global issues.	1. MET 4990 Coursework	90% of students with successful completion of MET 4990.	100% of all MET students successfully completed MET 4990. Spring 2012-present.	Acceptable level of performance to current specified metric.	No action required at present. Continue to evaluate.
10. (Cont)	2. MET Exit Exam (Part III)	60% of students receiving a minimum of 60% on the MET Exit Exam Part III.	Part III of Exit Exam to be implemented Spring 2015.	Planning to collect additional data from Exit Exam addition.	Implement Part III of the Exit Exam.
11. A commitment to quality, timeliness and continuous improvement.	1. MET 4990 Coursework	90% of students with successful completion of MET 4990.	100% of all MET students successfully completed MET 4990. Spring 2012-present.	Acceptable level of performance to specified metric.	No action required at present. Continue to evaluate.

11. (Cont)	2. Senior Project Exit Survey	50% of all survey respondents indicate they understand the concepts of quality and continuous improvement and plan to utilize these philosophies in the their careers.	New survey is pending.	New survey is pending.	New exit survey to be implemented in Spring 2015.

E. Academic Advising

Advising Strategy and Process

All Mechanical Engineering Technology students are required to meet with a faculty advisor at least annually for course and program advisement. Students may call 801-626-6305 for more information or to schedule an appointment. Advisement may also be obtained in Engineering Technology, room 214.

Effectiveness of Advising

The current advisement process appears to be effective as there are very few issues concerning wrong advising. Advising as done in the program covers both career guidance and what courses students need to be taking.

Past Changes and Future Recommendations

There currently are no plans to change the current advising process.

F. Faculty

Faculty Demographic and Diversity Information

The Mechanical Engineering Technology program currently has two full-time faculty members and approximately 2 adjunct faculty who teach part-time. The number of adjuncts varies by semester and is included in the subcategory on adjuncts. The MET program will be seeking an additional faculty member for the 2015-2016 academic year.

Main Categories		
	Subcategories	Number
Gender	Male	2
	Female	0
Ethnicity	Euro-American	2
	Other	0
Degree	PhD	1
	Masters	1
	Bachelors	0
Rank/Tenure	Tenured	1
	Tenure Track	1
	Instructor	0
	Adjunct	2
Year Teaching	<5	1
	5-20	1
	>20	0

Programmatic/Departmental Teaching Standards

All faculty in the College are expected to be good teachers. Where there is a perceived weakness in a faculty member's teaching, they are counseled by a mentor, encouraged to attend the on-campus presentations on teaching, and in some cases have been sent to national conferences specific to teaching.

Faculty Qualifications

To be tenured or be hired on tenure track, faculty must meet one of the two following requirements:

1. Attainment of the earned doctorate in a field applicable to Mechanical Engineering Technology and three years of full-time industrial experience.
2. Attainment of a master's degree in a field applicable to Mechanical Engineering Technology and five years of full-time industrial experience.

Adjunct faculty must have a degree in Mechanical Engineering Technology or its equivalent or in a related field and be currently active in the content area in which they are teaching.

Evidence of Effective Instruction

i. Regular Faculty
   Tenure track faculty are evaluated each semester for every class they teach. Tenured faculty are evaluated in at least one class each semester they teach. Any concerns raised by these evaluations are discussed with the department chair.

ii. Adjunct Faculty
   Adjunct faculty are evaluated each semester for every class they teach. Any concerns raised by these evaluations are discussed with the department chair.

Mentoring Activities

Faculty are mentored by the program coordinator and by the program chair. Faculty mentors also work with adjunct faculty to improve teaching and to assist with classroom issues such as testing, syllabi, online, cheating, and classroom discipline.

Ongoing Review and Professional Development

Tenure track faculty are reviewed informally once a year by the department chair and formally during their third and sixth years. Tenured faculty are reviewed formally every three years by the department chair.

Faculty members are provided opportunities for professional development in areas of instruction, scholarship, and service. This includes taking professional courses, attending

and/or presenting at professional conferences, and participating in research and scholarly discussion groups on campus. In addition, all faculty are encouraged to submit proposals to the Research Scholarship and Professional Growth Committee and the Academic Resources and Computing Committee.

G. Support Staff, Administration, Facilities, Equipment, and Library

Adequacy of Staff

The department has one and a half technicians, one secretary, and one student aide that are shared among all of the programs. This number of staff is adequate to meet the needs of the program.

i. Ongoing Staff Development

Staff are encouraged to seek professional development where appropriate and have attended conferences off-campus and out-of-state paid for by the College.

Adequacy of Administrative Support

While the operating budgets are adequate to support the program, there is no capital equipment budget in the College. Therefore acquisition of new equipment is dependent upon other sources of funding which can be problematic. In addition, there is a definite lack of support for hiring new faculty which causes the faculty in the program to teach overloads thus reducing their time to participate in scholarly activities or service.

Adequacy of Facilities and Equipment

The primary tool used by the program is the personal computer. Currently the College is able to replace its computers every three years which is sufficient to keep them current with the available software. Some of the equipment used in the support courses is getting old and in need of replacement. Because of the budget situation discussed in the previous paragraph, the issue of when this equipment will be replaced is somewhat problematic.

Adequacy of Library Resources

The library resources are adequate to support the program.

H. Relationships with External Communities

Description of Role in External Communities

The program has a strong and ongoing relationship with the external community, particularly with the companies that employ its graduates. A partial list of companies the program interfaces with is shown below:

Advanced Drainage Systems
Associated Food Stores
ATK
Autoliv
Barnes Aerospace*
Boeing*
Cerrowire
Chromolox*
Clean Machine*
ClearStream Environmental*
CT Film
DCA
DFG
England/Corsair
Fieldcrest Cabinets
FMC JBT Corporation*
Fresenius
Futura Industries*
Great Salt Lake Mineral
GSC Foundries*
Honeywell
Intouch Machining
JD Machine*
Layton City
LeanWerks*
L3 Communications
Lifetime Products*
Naptech
National Standard
Northrop Grumman
Orbit
Parker Hannifin
Petersen, Inc.
PRE Manufacturing*
ProMold*
Setpoint Systems
Sydandee Manufacturing
Syro
Wavel Huber Wood Products
Westech
Western Zirconium
Williams International*
W.R. White Company

* Companies with current members on the Industrial Advisory Committee – See Appendix E.

Summary of Industrial Advisory Committee (IAC) Minutes

The last IAC meeting for the program was held on April 23, 2014. The following items were discussed at this meeting:

- MET Program growth (need for additional faculty)
- Senior project support (lab fees / possible industry donations)
- Software license & scholarship needs
- Upcoming ABET accreditation visit (Fall 2015)

The next Industry Advisory Board meeting is scheduled for April 15, 2015.

I. Results of Previous Program Reviews

Problem Identified	Action Taken	Progress
Issue 1	Previous 5 Year Program Review:	
	Year 1 Action Taken:	
	Year 2 Action Taken:	
	Year 3 Action Taken:	
	Year 4 Action taken:	
Issue 2	Previous 5 Year Program Review:	
	Year 1 Action Taken:	
	Year 2 Action Taken:	
	Year 3 Action Taken:	
	Year 4 Action taken:	

Summary Information

The previous program reviews were not available so there is no information available regarding any actions taken based on those reviews.

J. Action Plan for Ongoing Assessment Based on Current Self Study Findings

Action Plan for Evidence of Learning Related Findings

Problem Identified	Action to Be Taken
Issue 1	Current 5 Year Program Review:
	Year 1 Action to Be Taken:
	Year 2 Action to Be Taken:
	Year 3 Action to Be Taken:
	Year 4 Action to Be Taken:
Issue 2	Current 5 Year Program Review:
	Year 1 Action to Be Taken:
	Year 2 Action to Be Taken:
	Year 3 Action to Be Taken:
	Year 4 Action to Be Taken:

Summary Information (as needed)

Action Plan for Staff, Administration, or Budgetary Findings

Problem Identified	Action to Be Taken
Issue 1 Additional faculty for course load	Current 5 Year Program Review:
	Year 1 Action to Be Taken: Add 1 MET Faculty Member
	Year 2 Action to Be Taken:
	Year 3 Action to Be Taken:
	Year 4 Action to Be Taken:
Issue 2	Current 5 Year Program Review:
	Year 1 Action to Be Taken:
	Year 2 Action to Be Taken:
	Year 3 Action to Be Taken:
	Year 4 Action to Be Taken:

Summary Information

A requisition has been place to hire a tenure track faculty member for the 2015-2016 academic year.

K. Summary of Artifact Collection Procedure

Artifact	Learning Outcomes Measured	When/How Collected?	Where Stored?
MET Exit Exam	1-11	Bi-annual	electronic copies

Summary Information (as needed)

APPENDICES

Appendix A: Student and Faculty Statistical Summary

	2009-10	2010-11	2011-12	2012-13	2013-14
Student Credit Hours Total	1,585	1,869	2,015	1,992	2,535
Student FTE Total	52.83	62.30	67.17	66.40	84.50
Student Majors	178	192	238	273	245
Program Graduates					
Associate	4	4	8	3	5
Baccalaureate	8	15	19	19	27
Student Demographic Profile					
Female	8	6	10	13	18
Faculty FTE Total*	2.85	3.33	3.38	2.62	3.51
Adjunct FTE*	0.85	1.33	1.38	0.62	1.51
Contract FTE*	2.00	2.00	2.00	2.00	2.00
Student/Faculty Ratio**	18.54	18.71	19.87	25.34	24.07

Note: Data provided by Institutional Research

Appendix B: Contract/Adjunct Faculty Profile (MET)

Name	Gender	Ethnicity	Rank	Tenure Status	Highest Degree	Years of Teaching	Areas of Expertise
Doug Hogge	M	W	N/A	N/A	MS	1	Design, FEA
Adam Hazzard	M	W	N/A	N/A	MBA	3	Design

Appendix C: Staff Profile (ALL ET)

Name	Gender	Ethnicity	Job Title	Years of Employment	Areas of Expertise
Roger Anderson	M	W	Technician	24	Equip. Maintenance, Computers
Cordell Gold	M	W	Technician	1	Equip. Maintenance
Pat DeJong	F	W	Admin. Spec.	9	Administration

Appendix D: Financial Analysis Summary

Department	2009-10	2010-11	2011-12	2012-13	2013-14
Undergraduate					
Instructional Costs	151,815	245,670	218,146	220,387	219,897
Support Costs					
Other Costs	0	0	32	2,511	388
Total Expense	151,815	245,671	218,146	222,898	220,285

Note: Data provided by Provost's Office

Appendix E: External Community Involvement Names and Organizations (MET)

Name	Organization
Dan Berry	Barnes Aerospace
Matt Wardle	JD Machine
Brian DeRoche	JBT Corporation
Dave Farrell	ProMold, Inc.
Mark Jones	Clean Machine
Reid Leland	LeanWerks
Mark Ripke	Boeing
Dan Taylor / Jared Bringhurst	Futura Industries
Dave Winter / Cody Hathaway	Lifetime Products
Craig Johnson	Chromolox
Mark Hardcastle	PRE Manufacturing
Travis Kenworthy	ClearStream Environmental
Doug Hogge / Jake Funk	Williams International

Appendix F: External Community Involvement Financial Contributions (ALL ET)

Organization	Amount	Type
Perkins – US Dept. of Education	$16,900	Grant
Mark Graves	$40,000*	Donation
J D Machine	$50,000*	"
David Roubinet	$2,800/yr*	"
Autoliv	$5,000/yr*	"
Parker Aerospace	$5,000/yr*	"
Barnes Aerospace	$2,500/yr*	"

*For the Engineering Technology Department and shared among the four programs in the department.