Manufacturing Engineering Technology

2014-15 Assessment Report

I. Introduction

The Bachelor of Science program in Manufacturing Engineering Technology is offered in three locations[3] Klamath Falls, Wilsonville, and at the Seattle campus located at Boeing. During the years 2004-2014, fall term full and part-time enrollment ranged from 75 to 147, with a high during 2005 of 147 students. Fall term 2014 enrollment was 80 full and part-time students. During the 2013-14 year, the program graduated a total of 5 students. The program has little data from this group of graduates with only two responding to the Career Services Graduate Survey six months after graduation, but data reported from graduates of 2011-12, 2012-13, and 2013-14 in aggregate reported an average salary of $64,625-$70,000.

ectives as shown in Table 1.

Program Objective Assessment Cycle	2014-15	2015-16	2016-17
Review Program Mission and Educational Objectives by the industrial advisory committee	x		
Assess and/or Review Program Mission and Educational Objectives with Constituents (survey, meetings)		x	

Table 1. Program Education Objectives Assessment Cycle

III. Three-Year Cycle for Assessment of Student Learning Outcomes

The faculty planned a three-year assessment cycle IRUWKHSURJUDPVVWXGHQWOHDUQLQJRXWFRPHVDVVKRZQ in Table 2.

Student Learning Outcome	2014-15	2015-16	2016-17	
a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities			x	
b. an 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	x			
c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes			x	
d an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives	x			
e. an ability to function effectively as a member or leader on a technical team		x		
f. an ability to identify, analyze, and solve broadly-defined engineering technology problems	x			
g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature			x	
h. an understanding of the need for and an ability to engage in self-directed continuing professional development			x	
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity		x		
j. a knowledge of the impact of engineering technology solutions in a societal and global context		x		
k. A commitment to quality, timeliness, and continuous improvement		x		

IV. Summary of 2014-15 Assessment Activities

The Manufacturing Engineering Technology faculty conducted formal assessment of four student learning outcomes during 2014-15. These outcomes have been mapped to the curriculum as shown in Appendix A.

SLO b. An 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.

The performance criteria for this learning outcome are:

1. Select and apply math principles to obtain analytical or numerical solution(s) to an engineering problem.
2. Select and apply scientific principles that govern the performance of a given process or system in engineering problem(s).
3. Select and apply engineering principles that govern the performance of a given process or system in engineering problem(s).
4. Select and apply appropriate technology tools (software, equipment, CAD, CNC, instrumentation, etc.) for a given process or system to an engineering problem.

Direct Assessment #1 Klamath Campus
The faculty assessed this outcome in MET 315 Machine Design I fall term 2014, using an exam scored with a rubric. This assessment was administered to students from all majors in the MMET Department. There were five manufacturing students involved in the assessment, the results are shown in Table 3.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Selects & applies math principles	Rubric-scored exam questions	1		

Direct Assessment #2 Klamath Campus
The faculty assessed this outcome in MET 360 Materials II fall term 2014, using an exam scored with a rubric. This assessment was administered to students from all majors in the MMET Department. There were four manufacturing students involved in the assessment, the results are shown in Table 4.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Selects & applies math principles				

Direct Assessment #4 Wilsonville Campus
The faculty assessed this outcome in MET 360 Materials II spring term 2015, using exam questions scored with a rubric. This assessment was administered to students from all majors in the MMET Department. There was one manufacturing student involved in the assessment, the results are shown in Table 6.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Selects & applies math principles	Rubric-scored exam questions	1-4 proficiency scale	80% score 3 or 4	

SLO d. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives

The performance criteria for this learning outcome are

1. Identify an appropriate set of realistic constraints and performance criteria.
2. Generate one or more creative solutions to meet the criteria and constraints.
3. Create a detailed design within realistic constraints.
4. Plan and manage a small technical project.

Direct Assessment #1 Klamath Campus

The faculty assessed this outcome in MFG 343 Manufacturing Tool Design winter term 2015, using a project scored with a rubric. There were six manufacturing students involved in the assessment. The results are shown in Table 10.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Identify constraints & criteria	Rubric-scored project	1-		

Direct Assessment #3 Wilsonville Campus
The faculty assessed this outcome in MFG 344 Design of Manufacturing Tooling, spring term 2015, using a project scored with a rubric. This assessment was administered to students from all majors in the MMET Department. There were four manufacturing students involved in the assessment. The results are shown in Table 11.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Identify constraints & criteria	Rubric-scored project	1-4		

Direct Assessment #5 Seattle Campus
The faculty assessed this outcome in MECH 316 Machine Design II winter term 2015, using an assignment scored with a rubric. This assessment was administered to students from all majors in the MMET Department. There were three manufacturing students involved in the assessment. The results of the manufacturing students are shown in Table 13.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Identify constraints & criteria	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	66.7%

Direct Assessment #4 Wilsonville Campus

SLO M1. Graduates must demonstrate the ability to apply the following to the solution of manufacturing problems to achieve manufacturing competitiveness: (a) materials and manufacturing processes; (b) product design process, tooling, and assembly; (c) manufacturing systems, automation, and operations; (d) statistics, quality and continuous improvement, and industrial organization and management.

The performance criteria for this learning outcome are:

1. Materials and manufacturing processes
2. Product design process, tooling and assembly
3. Manufacturing systems, automation, and operations
4. Statistics, quality and continuous improvement
5. Industrial organization and management

Direct Assessment #1 Klamath Campus

The faculty assessed this outcome in MFG 233 Statistical Methods for Quality Improvement winter term 2015, using a project scored with a rubric. There were eleven manufacturing students involved in the assessment. The results are shown in Table 20.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Materials and manufacturing processes	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	82%
Product design process, tooling, and assembly	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	73%
Manufacturing systems, automation, and operations	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	55%
Statistics, quality and continuous improvement	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	82%
Industrial organization and management	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	82%

Table 20. Assessment Results for SLO M1, winter 2015, Klamath Campus

Strengths: The project is well designed to capture practice from theories to applications.

Weaknesses: Several students had difficulty in analyzing and planning manufacturing systems. In addition documentation of results lacked adequate organization and statement clarification.

Actions: Provide guidance to students as they learn to apply theory to practice.ment clarificayETBT1 0 0 1 169.22 195.89 T

Performance Criteria

Strengths: Understanding of what a Progressive Die is, Ability to calculate center of pressure.

Weaknesses: Understanding of drafting and dimensioning standards, Understanding of clearance requirements, project management skills.

Actions: Provide example of properly dimensioned part, review ASME standards. Make HW #1 be the project completion plan and request weekly project updates.

Direct Assessment #4 Wilsonville Campus

The faculty assessed this outcome in MGT 345 Project Management spring term 2015, using a project scored with a rubric. This project was geared toward project management and therefore a good DVVHVVPHQWIRUWKHLQGXVWULDORUJDQL]DWLRQDQGPDQDJHPHQWFXULWHULDIWKLVRXWFRPH address the other four criteria which were assessed in other courses. There was one manufacturing student involved in the assessment. The results are shown in Table 23.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Materials and manufacturing processes	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	N/A
Product design process, tooling, and assembly	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	N/A
Manufacturing systems, automation, and operations	Rubric-scored project	1		

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Materials and manufacturing processes	Rubric-scored			

Statistics, quality and continuous improvement	Rubric-scored project	1-4 proficiency scale	80% score 3 or 4	100%

V. Summary of Student Learning for 2014-15

MMET faculty from Klamath Falls and Wilsonville met on June 9, 2015 to review assessment results, to determine if improvements were needed, and to decide upon future action plans. A summary of their findings is outlined below.

SLO b. An 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

Strengths

Klamath:
MET315 ² The results indicate that the majority of students met faculty expectations for all criteria assessed. The instructor indicated that students were able evaluate and solve all problems with minimal guidance.

MET360 - The results indicate that the students met faculty expectations for all criteria assessed.

Wilsonville:
MFG333 - As the results show, faculty indicate that students were able to use math and science knowledge to solve the statistical process control problems involved in this assessment.

MET360 - For the most part students did an excellent job approaching problems in an organized and logical format.

Seattle:
MFG333 - Students met faculty expectations for each performance criteria assessed. Student were highly proficient in their usage of statistics.

MECH316 - Most students demonstrated the ability to apply theoretical knowledge gained during their education to real-world problems.

Weaknesses

Klamath:
MET315 - 7KHLQVWUFWRUVXHVWHGWKDWWKLVDVVHVVPHQWWRROGLGQRWIXOHYDOXDWHVW
select and apply scientific principles. Instructor feedback also indicated that students needed guidance to select certain aspects of engineering principles for this particular problem, but overall student performance met expectations for this outcome.

MET360 - None indicated by the results or instructor feedback.

Actions ð SLO b cont.

Klamath:
None needed at this time.

Wilsonville:
None needed at this time.

Seattle:
Program faculty will redesign the assignment in MFG333 to include scientific principles and include more design project type assignments in MECH316 and throughout the curriculum to improve on their abilities.

SLO d. An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives

Strengths

Klamath:
MFG343 ² Students were able to demonstrate strong skills in CAD, design and costing.

Wilsonville:
MFG344

Actions ð SLO d cont.

Seattle:
MFG463 - Program faculty were concerned about their ability to assess the performance of individual student in a team based project. During fall 2015 program faculty will redesign this assessment.

SLO f. An ability to identify, analyze, and solve broadly-defined engineering technology problems

Strengths

Klamath:
MFG313 ² Students have strong skills in applying engineering principles based on the fact that many have industry work experience.

MFG331 - Students were able to analyze the problem and correlate/reproduce the physical system as a PLC program.

Wilsonville:
MFG331 - Most of the student understood the problem and produced a working program to control the mixing tank.

MFG463 - Excellent creativity. Students followed the report templates hence they got good coverage of the essential points.

Weaknesses

Klamath:
MFG313 - Students had difficulty in documentation of results, specifically in format, statement clarification and organization.

MFG331 ² Some students light on documentation and patience while learning Microsoft Visio.

Wilsonville:
MFG331 - Some students were light on documentation and lacked adequate English language skills.

MFG463 - Some students deviated from the report.

Actions

SLO M1. Graduates must demonstrate the ability to apply the following to the solution of manufacturing problems to achieve manufacturing competitiveness: (a) materials and manufacturing processes; (b) product design process, tooling, and assembly; (c) manufacturing systems, automation, and operations; (d) statistics, quality and continuous improvement, and industrial organization and management.

Strengths

Klamath:

MFG333 ² The project is well designed to capture practice from theories to applications.

MFG342 - Students demonstrated good CAD/CAM work and well as good description and summary of work and operations lists to complete documentation.

Wilsonville:

MFG344 ² Understanding of what a Progressive Die is, Ability to calculate center of pressure.

MFG453 ² The students comprehended the problem presented and recognized many of the implications for automation.

VI. Summary of 2015 MFG Undergraduate Exit Survey, Klamath Falls Only

Spring 2015 Exit Survey SLO b

Location (responses)	Highly Prepared	Prepared	Inadequately Prepared
Klamath Falls (4)	50%	50%	0%
Wilsonville (0)			
Seattle (0)			

Spring 2015 Exit Survey SLO d

Location (responses)	Highly Prepared	Prepared	Inadequately Prepared
Klamath Falls (4)	75%	0%	25%
Wilsonville (0)			
Seattle (0)			

Spring 2015 Exit Survey SLO f

Location (responses)	Highly Prepared	Prepared	Inadequately Prepared
Klamath Falls (4)	50%	50%	0%
Wilsonville (0)			
Seattle (0)			

Spring 2015 Exit Survey SLO M1

Location (responses)	Highly Prepared	Prepared	Inadequately Prepared
Klamath Falls			

SLO c. An ability to conduct standard tests and measurements; to conduct, analyze, and

Appendix A1
SLO-Curriculum Map

Outcome b: an 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

I = Introduced R = Reinforced E = Emphasized

	Freshman	Sophomore	Junior	Senior
Fall	Math 111 Coll Alg			

Appendix A3
SLO-Curriculum Map

Outcome f: an ability to identify, analyze, and solve broadly-defined engineering technology problems.

I = Introduced R = Reinforced E = Emphasized

FG6 Tm0 g 5y0.Q EMC /P <MCID 39.72 660.02 563.26 0.48004 24.72 ref*1 BT/1.05 MFG6 Tm0 g -0.4 <MCID 85/Lang (en)>BDC 205.

	Freshman			Sophomore			Junior			Senior		
Fall	Math 111	Coll Alg		MET 160	Materials	I	MET 375	Solid Model	E	MFG 453	Robotics	E
	MET 111	Orient I	I	MATH 252	Integral Calc		MFG 313	Mfg An & Plan	R	MFG 454	Thermal Sys	E
	WRI 121	Eng Comp		MFG								

Appendix A4
SLO-Curriculum Map

Going back to the Program Educational Objective we have MFG & MET PEOs and voted unanimously to remove students/ABET from Program Constituencies or we would have to ask them for input. The PEOs are directed more towards students five years after graduation.

someone has added words. We have to update rubrics, score sheets and assessment. All of them have changed except SLO K. A lot of work to be done.

MFG assessment needs to be broken out by program and site. In our response we should direct them to our website where everything is broken out separately.

Final concerns: Advising, curriculum, student progress, pre-reqs, professional development and Seattle facilities all were mentioned under concerns.