

Materials Sciences & Engineering Guide for Student Outcome Assessment and Document Submission

Document revised: Fall 2021

Both programs within the department, Metallurgical Engineering (MET E) and Materials Science and Engineering (MSE), have now adopted the same assessment of ABET student outcomes by direct assessment method. This document serves as a ‘how to guide’ of the direct assessment process, outcome-course assignments, submission process, notes on shared courses, and important dates.

If you have any questions, please reach out to Dr. Bates or Dr. Smith.

Student Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
8. An ability to understand structure, properties, processing, and performance relationships.

Outcome-Course Matrix

MET E (F2020/S2021)

	Student Outcomes	1	2	3	4	5	6	7	8
MET E 1630	Introduction to Metallurgical Engineering I							P	
MSE 1800	Contemporary MSE I			P	S				
MSE 1801	Contemporary MSE II		S		S	P			
MSE 2001	Python							P	
MSE 2010	Intro to MSE						P		
MET E 3070	Statistical Methods in Earth Sci & Eng						P		
METE 5750	Transport & Rate Phenom	P							
MET E 3610	Metallurgical Engineering Thermo I	S						S	
MET E 3630	Metallurgical Engineering Thermo II	P							
MET E 5260	Physical Metallurgy I	S							P
MET E 5450	Mechanical Behavior of Metals		S						P
MET E 5670	Mineral Processing I			S			S		
MET E 5700	Low Temperature Chemical Processing			S		S			
MET E 5710	High Temperature Chemical Processing					S	S		
MET E 5760	Process Synthesis, Design & Econ I		P	P	P	P		S	
MET E 5780	Metals Manufacturing Processes		P		P				S

MSE (F2020/S2021)

	Student Outcomes	1	2	3	4	5	6	7	8
MSE 1800	Contemporary MSE I			P	S				
MSE 1801	Contemporary MSE II		S		S	P			
MSE 2010	Intro to MSE						P		
MSE 2001	Python							P	
MSE 3061	Transport	P							
MSE 3410	Intro to Polymers					S		S	
MSE 3032	Intro to Thermodynamics	P							
MSE 3010	Processing Lab			S		P	P		
MSE 3011	Materials Characterization					S	P	P	
MSE 3210	EPS								P
MSE 3310	Introduction to Ceramics							S	P
MSE 5034	Kinetics	S							
MSE 5090	Professional Communications			P	P				
MSE 5098	Senior Design		P	S	P		S		
MSE 5099	Senior Thesis		P	P			S		
MET E 5450	Mechanical Behavior of Metals		S						P

Direct Assessment

Direct assessment is carried out every semester. In summary, the assessment process involves directly evaluating student work that is related to a program student outcome. Required courses are assigned student outcomes which are evaluated every semester. The course instructor uses a specific assignment/problem or set of assignments/problems, to assess the achievement of the outcome in the course. Only these specific assignment(s)/problem(s) are graded and saved. At the end of every semester, each instructor fills out an Outcome Assessment and Reflective Memo. These are documented by the instructor to discuss how the assignment/problem demonstrates the outcome, how well the students achieved the outcomes, and note any observations and/or changes and improvements to the course. Each student outcome is directly assessed in two different courses, with one secondary course. Every two years sets of sub-committees are formed to review outcome assessments, reflective memos, student work, course syllabi, and course student evaluations. These sub-committees assess the overall achievement of the student outcomes and any suggestions for improvement. These evaluations are summarized and discussed at faculty meetings and program corrective actions are formulated. A flowsheet of the process is shown in Figure 1.

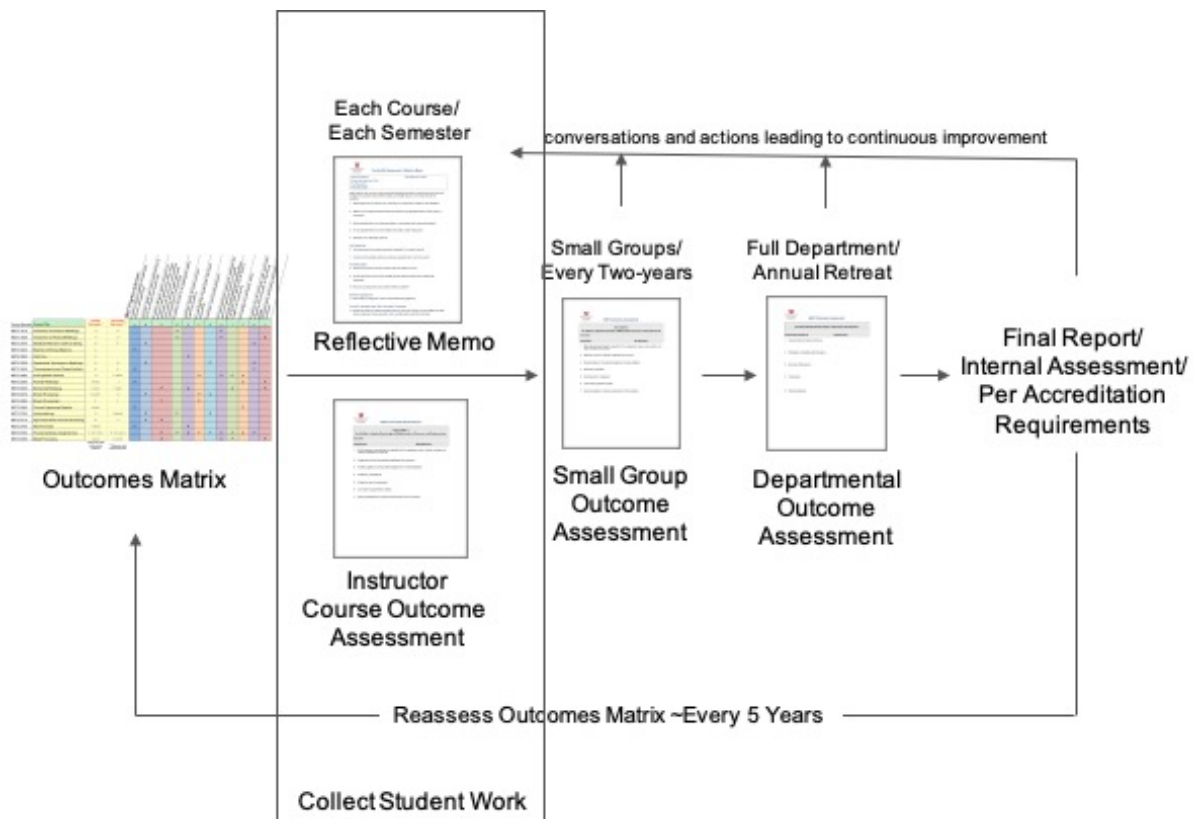


Figure 1. Flowsheet of direct assessment of student outcomes.

Outcome Assessment and Reflective Memo Guide

- For courses assigned as Primary (P) or Secondary (S), a specific problem(s)/an assignment/test/report are to be assigned in the class that addresses the designated outcome.
 - This could be part of one of your existing assignments (e.g., HW6, problem 5; or Midterm 1, question 3 and Midterm 2, question 4; or project/lab final reports). **Make sure to save copies of the students' work on these specific problems/assignments in pdf format.** If say a problem is part of an assignment, please do not submit the whole assignment, only the problem being assessed.
 - The specific problem(s)/an assignment/test/report need to be graded.
 - It's important to define the problem explicitly in the Outcome Assessment.
- For courses assigned with P, the problem/assignment addressing the outcome needs to be collected, graded, and assessed. For courses with S, the problem/assignment addressing the outcomes needs to be collected and graded, but not assessed. Secondary courses may be needed and used if necessity arises in meeting ABET requirements.
- For courses assigned with P, fill out the Outcome Assessment sheet your class. Report the average score of the assigned problem/assignment and assess of how well the students met the outcome evaluated.
 - Please fill out a separate Outcome Assessment for each outcome being assessed (e.g., a course is assigned two P's, say Outcomes 1 and 2. This instructor will submit an Outcome Assessment for Outcome 1 and a separate Outcome Assessment for outcome 2. Student work for both needs to be collected and assessed)
- For shared courses between the programs also with shared primary assignments (i.e., MSE 1800, MSE 1801, MSE 2001, MSE 2010, MSE 3061, MET E 3630, MET E 5450), two Outcome Assessments must be carried out, one for MSE students and one for MET E students. This also includes student work, i.e., collect, and separate student work by their program. Submit your assessment documents to the associated course ORG ID.
- After filling out the Outcome Assessment and reviewing your course evaluations, fill out the Reflective Memo.
 - The Reflective Memo is course specific. Only one Reflective Memo per course is needed.
- Specific file naming and formats are outline in the Documents Submission Details section. Please keep to the file naming format as it greatly helps with organization.
- Once you have completed your Outcome Assessment form and Reflective Memo, submit these documents along with the Student Work (as one file) and Course Syllabus (Documents Submission Details section).
- Please keep a personal copy of your ABET documents to ensure data redundancy.
- This new process minimizes the work done by the faculty and the assessment team drastically. Please utilize Ubox to store your own electronic copies to make it easier for record keeping and preparation for ABET reviews.

Document Submission Details

- For the MSE courses and assessment documents, submit your files using the webpage under ORG 67:
 - <https://mse.utah.edu/abet/>
- For MET E courses and assessment documents, submit your files using the webpage under ORG 108:
 - <https://mse.utah.edu/abet/>
- The Outcome Assessment templates are available on the submission webpage. Use of these is required.
- For Primary Outcome courses submit to your respective program the following documents:
 - Outcome Assessments
 - Single pdf file
 - File name: Outcome Assessment #_(course number)_(Instructor's last name)_(semester and year)
 - Student Work
 - Single pdf file
 - File name: SW_(course number)_(Instructor's last name)_(semester and year)
 - Reflective Memo
 - Single pdf file
 - File name: RM_(course number)_(Instructor's last name)_(semester and year)
 - Course Syllabus
 - Single pdf file
 - File name: Syllabus_(course number)_(Instructor's last name)_(semester and year)
- For Secondary Outcome courses submit to your respective program the following documents:
 - Student Work
 - Single pdf file
 - File name: SW_(course number)_(Instructor's last name)_(semester and year)_Secondary
 - Course Syllabus
 - Single pdf file
 - File name: Syllabus_(course number)_(Instructor's last name)_(semester and year)_Secondary

Important Submission Dates

For **Fall** semester courses please submit all of your assessment documents by **15-January**.

For **Spring** semester course please submit all of your assessment document by **01-June**.