

Outcome F. Graduates will have an understanding of professional and ethical responsibility.

Course	Performance indicators
ENGR 101, MAE 211, 342	Awareness of professional responsibility.
ENGR 101, MAE 211, 342	Awareness and understanding of ethical conflictive situations.
ENGR 101, MAE 211, 342	Grade distribution.

Tools used: Course assessment by faculty, Alumni survey, Employer survey.

Data Collection: The data are collected every semester based on the course offerings.

Frequency of data collection: The data are collected every time courses are taught.

Data Analysis: The data obtained are analyzed every year.

Closing the loop: This outcome is subject to review every year based on performance criteria and metrics and specific action items are developed, if necessary, to revise the content of the courses. The analyzed data are presented separately to the following groups in meetings.

- a) Feedback to students on all assignments
- b) Feedback to faculty, particular from majors.

Outcome and Performance Indicator		Performance Indicator Rubric				
Outcome F “Graduates will have an understanding of professional and ethical responsibility.”		Poor	Fair	Good	Very Good	Excellent
PI1	Awareness of professional responsibility	No notion of Prof. Resp.	Prof. Resp. mentioned	Prof. Resp. addressed	Prof. Resp. addressed and assessed	Prof. Resp. addressed and assessed & discussed
PI2	Awareness and understanding of ethical conflictive situations	No notion of ethical issues	Ethical issue mentioned	Ethical issue addressed	Ethical issue addressed and assessed	Ethical issue. addressed and assessed & discussed
PI3	Grade distribution	1 (F)	2 (D)	3 (C)	4 (B)	5 (A)
<p>Performance Indicator 1. (PI1). “<u>Awareness of professional responsibility.</u>” Engineers are professionals who engage in formal commitments when they practice their profession. These commitments involve professional responsibilities (PR) in the technical, social and personal areas. The following rubrics are used to assess this indicator:</p> <ul style="list-style-type: none"> - Poor. This rubric is used when exercises offering the opportunity to bring forward PR issues, do not involve any mention or reference to PR issues to address. - Fair. This rubric is used when exercises offering the opportunity to bring forward PR issues, involve some aspects of PR in a very general way. - Good. This rubric is used when exercises involve aspects of PR which are relevant. - Very Good. This rubric is used when exercises involve aspects of PR which are relevant, addressed and implications are presented. - Excellent. This rubric is used when in addition to the previous rubric; there is a discussion of consequences and potential scenarios related to PR. <p>Performance Indicator 2. (PI2). “<u>Awareness and understanding of ethical conflictive situations.</u>” Engineers often engage in professional situations that may put them in ethical dilemmas which call for sound professionally ethical judgment. The following rubrics are used to assess this indicator:</p> <ul style="list-style-type: none"> - Poor. This rubric is used when an exercise offering the opportunity to address an ethical conflictive issue, does not offer evidence of recognition of the ethical conflict. - Fair. This rubric is used when an exercise provides some evidence of recognition an ethical issue of conflict. - Good. This rubric is used when an exercise, provides evidence of recognition of the ethical conflict and suggests an ethical stance. 						

Very Good. This rubric is used when an exercise, provides evidence of recognition of the ethical conflict and the potential scenarios of the conflict and proposes an ethical stance.

Excellent. This rubric is used when in addition to the previous rubric; there is a description of the rationale involved in the proposed ethical stance and the consequences of failing to exercise ethical judgment.

Performance Indicator 3. (PI3). Grade distribution from class on applicable assignments or exercises. A, B, C, D

Assessment Tool:

Course Assessment Rubric by Faculty

Mechanical Engineering Program Course-Outcome Matrix
(October 2014)

ABET Outcome		a	b	c	d	e	f	g	h	i	j	k	
Required Course	Credit Hours	Apply Math, Science, and Engr	Design Experiments and Analyze and	Design System, Component, or Process	Multi-disciplinary Teams	Identify, Formulate and Solve Engr Problems	Professional and Ethical Responsibility	Communicate Effectively	Broad Education - Global and Societal	Life-long Learning	Contemporary Issues	Techniques, Skills, and Modern Engr Tools	Number of Outcomes per course
ENGR 101 <i>Engr. Problem Solving 1</i>	3						F	G					2
MAE 211 <i>Mechatronics</i>	3			C	D								2
MAE 241 <i>Statics</i>	3	A											1
MAE 242 <i>Dynamics</i>	3	A											1
MAE 243 <i>Mech. of Materials</i>	3					E							1
MAE 244 <i>Dynam. & Strength Lab</i>	1		B		D							K	2
MAE 316 <i>Analy. of Engr. Sys.</i>	3	A										K	2
MAE 320 <i>Thermodynamics</i>	3					E			H		J		3
MAE 321 <i>Applied Thermodynamics</i>	3					E					J		2
MAE 322 <i>Thermal and Fluids Lab.</i>	3		B					G					2
MAE 331 <i>Fluid Mechanics</i>	3	A									J		2
MAE 342 <i>Dynamics of Machines</i>	3					E	F						2
MAE 343 <i>Intermed. Mech. Matls.</i>	3	A								I			2
MAE 411 <i>Advanced Mechatronics</i>	3		B									K	2
MAE 423 <i>Heat Transfer</i>	3			C					H		J		3
MAE 454 <i>Machine Design and Mfg.</i>	3			C		E				I			3
MAE 456 <i>CAD & Finite Elem. Ana.</i>	3			C		E						K	3
MAE 460 <i>Automatic Controls</i>	3					E						K	2
MAE 471 <i>Prin. of Engr. Design</i>	3			C	D		F	G					4
No. of courses/outcome	55	5	3	5	2	7	3	3	2	2	4	5	
MATH 155 <i>Calculus 1</i>	4	r											
CHEM 115 <i>Fund. of Chemistry</i>	4	r	r				r						
ENGR 199 <i>Orientation to Engr.</i>	1	r		r		r	r	r		r	r		
ENGL 101 <i>Composition and Rhetoric</i>	3							r					
MATH 156 <i>Calculus 2</i>	4	r								r			
ENGR 102 <i>Engr. Problem Solving 2</i>	3	r		r		r							
PHYS 111 <i>General Physics</i>	4	r	r			r		r					
PHYS 112 <i>General Physics</i>	4	r	r			r		r		r			
ENGL 102 <i>Composition & Rhetoric</i>	3							r		r			
MATH 251 <i>Multivariable Calculus</i>	4	r								r			
MATH 261 <i>Elem. Diff. Equations</i>	4	r								r			
IENG 302 <i>Manufacturing Processes</i>	2	r		r	r								
IENG 303 <i>Manufact. Processes Lab</i>	1	r	r	r	r								
EE 221 <i>Intro. to Electrical Engr.</i>	3	r		r		r							
EE 222 <i>Intro. to Electrical Engr. Lab</i>	1	r	r	r									
GEC (21 hours)	21							r	r		r		
Technical Electives (6 hours)	6								r	r	r	r	

Outcome	ABET Assessment Team members To conduct Assessment of Year 2014	
a	Ismail Celik, Yu Gu, Mario Perhinschi and Pat Browning	Outcome a “Graduates will have an ability to apply knowledge of mathematics, science and engineering.”
b	Marvin Cheng, Alfred Lynam and Marcello Napolitano	Outcome b “Graduates will have an ability to design and conduct experiments, as well as to analyze data.”
c	Ken Means, Terry Musho and Greg Thompson	Outcome c “Graduates will have an ability to design a system, component or process to meet desired needs.”
d	Kostas Sierros, Jim Smith and Scott Wayne	Outcome d “Graduates will have an ability to function on multidisciplinary teams.”
e	Ever Barbero, John Kuhlman, Andrew Nix and Jason Gross	Outcome e “Graduates will have an ability to identify, formulate and solve engineering problems.”
f	Wade Huebsch and David Mebane	Outcome f “Graduates will have an understanding of professional and ethical responsibility.”
g	Salva Akkerman, Cosmin Dumitrescu and Nithi Sivaneri	Outcome g “Graduates will have an ability to communicate effectively.”
h	Victor Mucino and John Christian	Outcome h “Graduates will have the broad education necessary to understand the impact of engineering solutions in a global and societal context”.
i	Xingbo Liu, Ed Sabolsky and Samir Shoukry	Outcome i “Graduates will have a recognition of the need for, and an ability to engage in, life-long learning”.
j	Bruce Kang, Sam Mukdadi and Nick Wu	Outcome j “Graduates will have knowledge of contemporary issues.”
k	Larry Banta, Hailin Li and Xueyan Song	Outcome k “Graduates will have an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.”

MECHANICAL ENGINEERING				F	Outcome F-2014				
<p align="center">Outcome F</p> <p align="center">“Graduates will have an understanding of professional and ethical responsibility.”</p>				<p align="center">Assessment Team:</p> <p align="center">Wade Huebsch and David Mebane</p>					
<p align="center">Performance Indicators:</p> PI1. Awareness of professional responsibility PI2. Awareness and understanding of ethical conflictive situations PI3. Grade average for the entire class.				<p align="center">Rubrics for Performance Indicators:</p>					
					Poor (1)	Fair (2)	Good (3)	Very good (4)	Excellent (5)
<p>Performance: $P = (PI1 + PI2 + GA) / 3$</p> <p>P= Performance</p> <p>PI1 = Performance Indicator 1</p> <p>PI2 = Performance Indicator 2</p> <p>GA= Average grade of class in assignment*</p> <p>(if GA is based on 100 pt scale, divide by 20; if GA is based on 4 pt scale, multiply by 1.25)</p>				PI1	No awareness of professional responsibility evident	Some awareness of professional responsibility evident	Awareness and some understanding of professional responsibility evident	Awareness and understanding of professional responsibility evident	Acute awareness and thorough understanding of professional responsibility evident
				PI2	No awareness of ethical responsibility evident	Some awareness of ethical responsibility evident	Awareness and some understanding of ethical responsibility evident	Awareness and understanding of ethical responsibility evident	Acute awareness and thorough understanding of ethical responsibility evident
Course/Term	PI1	PI2	Grade Average*	Performance	Observations (Score explanation)				
ENGR 101									
MAE 342									
Other*									
Overall Performance 2014									
Average 2013									

Follow-up or Corrective Actions:	Responsible Person/Team/Cmte.
	To: AE CC
	To: Instructor (by Course)
	To: Instructor (by Course)
	To: Instructor (by Course)

MECHANICAL ENGINEERING			ENGR 101		Outcome F-2014				
Assessment Outcome F. “Graduates will have an understanding of professional and ethical responsibility.”				Assessment Team: Wade Huebsch and David Mebane					
Performance Indicators: PI1. Awareness of professional responsibility PI2. Awareness and understanding of ethical conflictive situations PI3. Grade average for the entire class.				Rubrics for Performance Indicators:					
Performance: $P = (PI1 + PI2 + GA) / 3$ P= Performance PI1 = Performance Indicator 1 PI2 = Performance Indicator 2 GA= Average grade of class in assignment* (if GA is based on 100 pt scale, divide by 20; if GA is based on 4 pt scale, multiply by 1.25)					Poor (1)	Fair (2)	Good (3)	Very good (4)	Excellent (5)
				PI1	No awareness of professional responsibility evident	Some awareness of professional responsibility evident	Awareness and some understanding of professional responsibility evident	Awareness and understanding of professional responsibility evident	Acute awareness and thorough understanding of professional responsibility evident
				PI2	No awareness of ethical responsibility evident	Some awareness of ethical responsibility evident	Awareness and some understanding of ethical responsibility evident	Awareness and understanding of ethical responsibility evident	Acute awareness and thorough understanding of ethical responsibility evident
									Observations (Score explanation)
Course MAE 475	PI1	PI2	Class Grade Ave.	Average					
Key Asg. 1 (HW)									
Key Asg. 2 (HW)									
Key Asg. 3 (HW)									
Test 1 (Problem)									
Test 2 (Problem)									
Other (Project)									
Total Average									

Overall Performance 2014		
Overall Performance 2013		
Follow-up or Corrective Actions:		Responsible Person/Team/Cmte.
		To: AE CC
		To: Instructor (by Course)

MECHANICAL ENGINEERING			MAE 342		Outcome F-2014				
Assessment Outcome F. “Graduates will have an understanding of professional and ethical responsibility.”				Assessment Team: Wade Huebsch and David Mebane					
Performance Indicators: PI1. Awareness of professional responsibility PI2. Awareness and understanding of ethical conflictive situations PI3. Grade average for the entire class.				Rubrics for Performance Indicators:					
Performance: $P = (PI1 + PI2 + GA) / 3$ P= Performance PI1 = Performance Indicator 1 PI2 = Performance Indicator 2 GA= Average grade of class in assignment* (if GA is based on 100 pt scale, divide by 20; if GA is based on 4 pt scale, multiply by 1.25)					Poor (1)	Fair (2)	Good (3)	Very good (4)	Excellent (5)
				PI1	No awareness of professional responsibility evident	Some awareness of professional responsibility evident	Awareness and some understanding of professional responsibility evident	Awareness and understanding of professional responsibility evident	Acute awareness and thorough understanding of professional responsibility evident
				PI2	No awareness of ethical responsibility evident	Some awareness of ethical responsibility evident	Awareness and some understanding of ethical responsibility evident	Awareness and understanding of ethical responsibility evident	Acute awareness and thorough understanding of ethical responsibility evident
									Observations (Score explanation)
Course MAE 342	PI1	PI2	Class Grade Ave.	Average					
Key Asg. 1 (HW)									
Key Asg. 2 (HW)									
Key Asg. 3 (HW)									
Test 1 (Problem)									
Test 2 (Problem)									
Other (Project)									
Total Average									

Overall Performance 2014		
Overall Performance 2013		
Follow-up or Corrective Actions:		Responsible Person/Team/Cmte.
		To: AE CC
		To: Instructor (by Course)

MECHANICAL ENGINEERING				MAE ___ (other)	Outcome F-2014				
Assessment Outcome F. “Graduates will have an understanding of professional and ethical responsibility.”				Assessment Team: Wade Huebsch and David Mebane					
Performance Indicators: PI1. Awareness of professional responsibility PI2. Awareness and understanding of ethical conflictive situations PI3. Grade average for the entire class.				Rubrics for Performance Indicators:					
Performance: $P = (PI1 + PI2 + GA) / 3$ P= Performance PI1 = Performance Indicator 1 PI2 = Performance Indicator 2 GA= Average grade of class in assignment* (if GA is based on 100 pt scale, divide by 20; if GA is based on 4 pt scale, multiply by 1.25)				Poor (1)	Fair (2)	Good (3)	Very good (4)	Excellent (5)	
				PI1	No awareness of professional responsibility evident	Some awareness of professional responsibility evident	Awareness and some understanding of professional responsibility evident	Awareness and understanding of professional responsibility evident	Acute awareness and thorough understanding of professional responsibility evident
				PI2	No awareness of ethical responsibility evident	Some awareness of ethical responsibility evident	Awareness and some understanding of ethical responsibility evident	Awareness and understanding of ethical responsibility evident	Acute awareness and thorough understanding of ethical responsibility evident
				Observations (Score explanation)					
Course MAE ___ (other)	PI1	PI2	Class Grade Ave.	Average					
Key Asg. 1 (HW)									
Key Asg. 2 (HW)									
Key Asg. 3 (HW)									
Test 1 (Problem)									
Test 2 (Problem)									
Other (Project)									
Total Average									

Overall Performance 2014		
Overall Performance 2013		
Follow-up or Corrective Actions:		Responsible Person/Team/Cmte.
		To: AE CC
		To: Instructor (by Course)

Assessment Tool:

Alumni Survey

MAE Alumni Survey of Educational Success

Dear Alum, in an effort to improve the quality of our Educational Programs in Mechanical and Aerospace Engineering, we would like to request few minutes of your time to help us assess the level of attainment of our Educational Objectives and Learning Outcomes that our graduates exhibit in the development of their professional activity. This survey will serve as a tool for the assessment of our Program and is not intended to be used to evaluate you individually.

Please tell us your year of graduation and the degree that you earned.

This is a required question

In my work, I am able to apply knowledge of math, science and engineering effectively.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am able to design and conduct experiments, and analyze data.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am able to design a system, component or process to meet desired needs and constraints.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am able to function productively on multidisciplinary teams.

- Strongly Agree
- Agree
- Neutral

- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am able to identify, formulate and solve engineering problems.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I have a good understanding of professional and ethical responsibility.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am able to communicate effectively, both verbally and in writing.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I understand the impact of engineering solutions in a global and societal context.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I recognize the need for, and engage in, life-long learning.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am aware of and appreciate contemporary engineering issues.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am proficient in the use of techniques, skills and modern tools necessary for engineering practice.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

In my work, I am prepared to meet the varying demands of the workforce in the technological arena.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

Please add comments below to clarify or add to any of your answers above, or to provide general comments about the level of satisfaction you have with the way your education in the MAE department has prepared you for your career.

This is a required question

In general, How would you rate yourself in the following categories

	Poor	Fair	Good	Very Good	Excellent
Your proficiency in your field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your drive to learn on your own.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your preparedness to meet the demands of the job-market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please enter one response per row

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Assessment Tool:

Employer Survey

Employer Survey of MAE Graduates

Dear Employer, in an effort to improve the quality of our Educational Programs in Mechanical and Aerospace Engineering, we would like to request few minutes of your time to help us assess the level of attainment of our Educational Objectives and Learning Outcomes that our graduates exhibit in the development of their professional activity in your company. This survey will serve as a tool for the assessment of our Program and is not intended to be used to evaluate the graduate's work for you or in your company.

Please tell us how many WVU MAE graduates you employ, and for how long.

This is a required question

WVU MAE graduates in my employ are able to apply knowledge of math, science and engineering effectively.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are able to design and conduct experiments, and analyze data.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are able to design a system, component or process to meet desired needs and constraints.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are able to function productively on multidisciplinary teams.

- Strongly Agree
- Agree

- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are able to identify, formulate and solve engineering problems.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ have a good understanding of professional and ethical responsibility.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are able to communicate effectively, both verbally and in writing.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ understand the impact of engineering solutions in a global and societal context.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ recognize the need for, and engage in, life-long learning.

- Strongly Agree
- Agree
- Neutral

- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are aware of and appreciate contemporary engineering issues.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are proficient in the use of techniques, skills and modern tools necessary for engineering practice.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

WVU MAE graduates in my employ are prepared to meet the varying demands of the workforce in the technological arena.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- Not Applicable

This is a required question

Please add comments below to clarify or add to any of your answers above, or to provide general comments about the level of satisfaction you have with graduates of the MAE department at WVU.

This is a required question

In general, How would you rate WVU MAE graduates in the following categories

	Poor	Fair	Good	Very Good	Excellent
Proficiency in his/her field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drive to learn on his/her own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preparedness to meet the demands of the job market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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