

# **2012-2013 M.S. in Chemical Engineering Academic Assessment Plan**

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*Office of the Provost*

*University of  
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*Institutional  
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*Continuous Quality  
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# Academic Assessment Plan for the M.S. Degree in Chemical Engineering

College of Engineering

## A. Mission

The mission of the Department of Chemical Engineering is stated as follows:

*To offer high-quality undergraduate and graduate degree programs in chemical engineering, and to conduct research that helps educate graduate students and serves the needs of Florida and the nation.*

### Support to the mission of the College of Engineering

The mission of the College of Engineering is stated as follows

*The College of Engineering fosters and provides world-class programs in engineering education, research and service to enhance the economic and social well-being of the citizens of Florida, the nation and the world.*

The department's mission supports the college's mission by addressing the college's the world-class program aspirations through the delivery of high-quality degree programs in chemical engineering, and by helping to educate chemical engineering students who can enhance the economic and social well-being of the state of Florida.

### Support to the mission of the University of Florida

The department's mission lends support to the following elements of the university's mission (itemized below for easy reference):

*(a) It is the mission of the University of Florida to offer broad-based, exclusive public education, leading-edge research and service to the citizens of Florida, the nation and the world.*

*(b) Teaching is a fundamental purpose of this university at both the undergraduate and graduate levels.*

*(c) Research and scholarship are integral to the education process and to the expansion of our understanding of the natural world, the intellect and the senses.*

Element (a) of the university's mission is supported by the department's mission-explicit mandate to educate students who can serve the needs of the state of Florida. Element (b) is supported by the department's commitment to offer undergraduate and graduate chemical-engineering degrees that are of high quality, hence addressing the fundamental nature of the teaching purpose of the university. Element (c) is supported through the department's mission-explicit statement to educate graduate students through a research venue focusing on chemical engineering.

## B. Student Learning Outcomes and Assessment Measures

SLO Type	Student Learning Outcome	Assessment Method	Degree Delivery
Knowledge	<ul style="list-style-type: none"> <li>a. Ability to identify a problem</li> <li>b. Ability to formulate a problem</li> <li>c. Ability to solve engineering problems</li> <li>d. Ability to critically read engineering literature</li> </ul>	<p>Evaluated by:</p> <p>(1) The Supervisory Committee through the written <i>M.S. Dissertation</i> and the oral <i>M.S. Dissertation Defense</i> (Thesis-Track students)</p> <p>(2) The Research Advisor through the written <i>MSNT Final Project</i> (Non-Thesis -Track students)</p> <p>(3) The Supervisor of an <i>Industrial Internship Experience</i> (Non-Thesis-Track students who elect the internship option)</p> <p><i>Rubric:</i> The rubric identifies each of the SLOs of this type.</p> <p><i>Metric:</i> Each SLO is evaluated through a scoring scale of 0 (SLO Not Met), 1 (Partially Met), and 2 (Met).</p>	Campus
Skills	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice at an advanced level	Same as above.	Campus
Professional Behavior	Ability to communicate effectively	Same as above.	Campus

## C. Research

The Masters of Science degree is offered along two tracks with different research requirements:

- (a) The Masters of Science Thesis Option (MST)
- (b) The Masters of Science Non-Thesis Option (MSNT)

### Masters of Science Thesis Option (MST)

The Masters of Science Thesis Option (MST) degree program in Chemical Engineering at the University of Florida is designed so that it can be completed in five academic terms (namely, two calendar years with the exception of one summer). The program provides an opportunity to develop an in-depth knowledge of chemical engineering fundamentals, to emphasize a specific specialization area, and to acquire experience in research through the completion and oral defense of a masters-level dissertation.

All MST students select a Research Advisor by the end of their first semester in the department. A Supervisory Committee, comprised of at least two members of the University's Graduate Faculty, must be identified and constituted by the degree candidates no later than the end of their second semester of residence in the department.

The Chemical Engineering MST program expects students to be able to explore and successfully resolve a research problem deemed of academic merit by the Supervisory Committee. The student's Research Advisor typically states the definition of the research problem, though the program allows for the student to take initiative to define a problem provided that prior approval is given by the Research Advisor.

All M.S. Thesis-Option students are required to document their research results in a scientifically rigorous and scholarly written *M.S. Dissertation*, and to successfully argue for the merits of the dissertation in a oral *M.S. Dissertation Defense* exam conducted in front of the Supervisory Committee.

The department offers a weekly graduate seminar series with presenters of local, national, and international affiliations, and focused on research topics that are intended for the educational benefit of graduate students. All MST students are encouraged to register for seminar attendance.

Research projects for MST students are sometimes supported by research grants, which commonly include travel funds for students to present their research results at national conferences. All MST

students involved in experimental research are required to complete safety training on an annual basis.

### Masters of Science Non-Thesis Option (MSNT)

The Masters of Science Non-Thesis Option (MSNT) degree program in Chemical Engineering at the University of Florida is designed so that it be completed in one calendar year (namely, consecutive Fall, Spring, and Summer terms). The program provides an opportunity to develop an in-depth knowledge of chemical engineering fundamentals, to emphasize a specific specialization area, and to acquire basic experience in research or industrial practice through a short internship.

The Chemical Engineering MSNT program requires students enroll for 6 credits in one of the following academic venues:

- (I) Completion of a research project
- (II) Completion of an industrial internship
- (III) Completion of graduate elective courses

All MSNT students select a Research Advisor by the end of their first semester in the department.

All MSNT students are required to produce a document entitled *MSNT Final Report* that is evaluated by the Research Advisor. The *MSNT Final Report* for students pursuing venues (I) or (II) must document details of a completed research project or a completed industrial internship experience. Students in venue (III) are required to write an *MSNT Final Report* that discusses Contemporary Issues in Chemical Engineering that involve the graduate elective courses.

MSNT students in venue (I) are expected to be able to explore and successfully complete a research project deemed of academic merit by the student's Research Advisor. The scope of the research work in venue (I) is defined to ensure that the project can be completed in one term.

The department offers a weekly graduate seminar series with presenters of local, national, and international affiliations, and focused on research topics that are intended for the educational benefit of graduate students. All MSNT students are encouraged to register for seminar attendance.

All MSNT students involved in experimental research are required to complete safety training on an annual basis.

## D. Assessment Timeline

The assessment time for each of the program's student learning outcomes is indicated in the table given below as occurring when (1) the *M.S. Dissertation Defense* event takes place for M.S. Thesis Option (MST) students, and (2) the *MSNT Final Report* is submitted for grading by the M.S. Non-Thesis (MSNT) students. In addition, an assessment (3) is done by the Industrial Internship Supervisor for MSNT students who opt to pursue the internship option (*cf.* item (II) in Section C) immediately following the date of completion of the experience.

The assessment tool used is the rubric described in Section F.

M.S. in Chemical Engineering

College of Engineering

SLOs	Assessment	Assessment
	M.S. Thesis Option (MST)	M.S. Non-Thesis Option (MSNT)
<b>Knowledge</b>		
Ability to identify a problem	(1) MS Dissertation Defense	(2) MSNT Final Report Submission (3) Date of Completion of Internship*
Ability to formulate a problem	(1) MS Dissertation Defense	(2) MSNT Final Report Submission (3) Date of Completion of Internship*
Ability to solve engineering problems	(1) MS Dissertation Defense	(2) MSNT Final Report Submission (3) Date of Completion of Internship*
Ability to critically read engineering literature	(1) MS Dissertation Defense	(2) MSNT Final Report Submission (3) Date of Completion of Internship*
<b>Skills</b>		
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice at an advanced level	(1) MS Dissertation Defense	(2) MSNT Final Report Submission (3) Date of Completion of Internship*
<b>Professional Behavior</b>		
Ability to communicate effectively	(1) MS Dissertation Defense	(2) MSNT Final Report Submission (3) Date of Completion of Internship*

\* Applicable only for MSNT students who opt for the industrial internship venue identified in item (II) of Section C.

## E. Assessment Cycle

Assessment Cycle for:

M.S. in Chemical Engineering

College of Engineering

Analysis and Interpretation:

May - June

Program Modifications:

Completed by September 15

Dissemination:

Completed by October 15

SLOs	Year	10-11	11-12	12-13	13-14	14-15	15-16
<b>Knowledge</b>							
Ability to identify a problem			X	X	X	X	X
Ability to formulate a problem			X	X	X	X	X
Ability to solve engineering problems			X	X	X	X	X
Ability to critically read engineering literature			X	X	X	X	X
<b>Skills</b>							
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice at an advanced level			X	X	X	X	X
<b>Professional Behavior</b>							
Ability to communicate effectively			X	X	X	X	X

The assessment timeline indicated in Section D is implemented so that the assessment data is collected once in each cycle.



## F. Measurement Tools

For M.S. Thesis Option (MST) degree students, a Supervisory Committee of at least two Graduate-Faculty members evaluates the written dissertation during a formal oral exam. The committee either passes or fails the student, and also utilizes the rubric shown below to assess all Student Learning Outcomes of the program using a scale of **0 (SLO not met)**, **1 (SLO partially met)**, and **2 (SLO met)**. For M.S. Non-Thesis Option (MSNT) degree students, the rubric is filled by the Research Advisor, and for those students who choose an industrial internship venue a rubric is also filled out by the internship Supervisor.



Chemical Engineering Department  
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# LEARNING OUTCOMES ASSESSMENT FORM

Student Name: \_\_\_\_\_ Student UF ID: \_\_\_\_\_

Advisor/Supervisor Name: \_\_\_\_\_ Student Degree Goal: \_\_\_\_\_

Assessment Tool:  Doctoral Research-Plan Defense  Thesis Defense  Final Project  Internship Event

**Instructions:** The advisor or internship supervisor is asked to assign a single numeric score for each outcome. This information is confidential and therefore should not be shared with students. Please return the completed form to the Graduate Program Secretary, Ms. Shirley Kelly.

OUTCOME	MERIT CRITERIA	QUANTITATIVE SCORING SCALE			OUTCOME SCORE
		2	1	0	
<b>KNOWLEDGE</b>					
Ability to identify a problem	This outcome is judged through the evaluation of the thesis for PhD and MS students and the Final Report for MSNT students	Is able to observe phenomena and extract interesting problems from the observations	Is able to identify important issues but is not able to define the issues into a problem	Cannot identify important issues and problems in the research	
Ability to formulate a problem	This outcome is judged through the evaluation of the thesis for PhD and MS students and the Final Report for MSNT students	Is able to convert the identified problem into a mathematical formulation	Is able to convert the problem into a suitable description but is not able to convert it to an appropriate mathematical formulation	Requires a lot of help in converting a problem into an appropriate formulation	
Ability to solve engineering problems	This outcome is judged through the evaluation of the thesis for PhD and MS students and the Final Report for MSNT students	Is able to solve the formulated problem relatively independently	Requires help in solving the formulated problem	Lacks the ability to solve the formulated problem	
Ability to critically read engineering literature	This outcome is judged through the evaluation of the thesis for PhD and MS students and the Final Report for MSNT students	Is able to find relevant papers, read the papers, and utilize the papers in research	Is able to find and read papers, but has some problems in understanding the material and integrating it in research	Cannot find important literature.	
<b>SKILL</b>					
Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice at an advanced level	This outcome is judged through the evaluation of the thesis for PhD and MS students and the Final Report for MSNT students	Is able to demonstrate mastery of the ability to use techniques, skills, and tools utilized in the research	Is able to demonstrate a good understanding and ability to use in future for techniques, skills, and tools utilized in research	Cannot demonstrate the ability to use techniques, skills and tools utilized in research	
<b>PROFESSIONAL EXPERIENCE</b>					
Ability to communicate effectively	This outcome is judged through the evaluation of the thesis for PhD and MS students and the Final Report for MSNT students	Wrote an excellent report and gave an excellent presentation	Wrote a good report and gave a good presentation	Did not write a good report, nor gave a good presentation	

## G. Assessment Oversight

The Department Chair, assisted by the Director of Graduate Studies and the department's SACS and ABET Coordinator, provides oversight of the assessment. Relevant contact information is shown below. A professional Graduate Academic Advisor provides clerical assistance. The doctoral student's Supervisory Committee fills out the rubric used as measurement tool (*cf.* Section F). The names and contact information of individuals carrying out the oversight responsibilities are given in the table shown below.

Name	Department Affiliation	Email Address	Phone Number
Prof. Richard B. Dickinson	Department Chair	<a href="mailto:dickinson@che.ufl.edu">dickinson@che.ufl.edu</a>	(352) 392-0882
Prof. Anuj Chauhan	Director of Graduate Studies	<a href="mailto:chauhan@che.ufl.edu">chauhan@che.ufl.edu</a>	(352) 392-2592
Prof. Oscar D. Crisalle	SACS and ABET Coordinator	<a href="mailto:crisalle@che.ufl.edu">crisalle@che.ufl.edu</a>	(352) 392-5120
Mrs. Shirley Kelly	Graduate Academic Advisor	<a href="mailto:shirley@che.ufl.edu">shirley@che.ufl.edu</a>	(352) 392-4753

The specific responsibilities of the oversight personnel are as follows:

<i>Department Chair</i>	Provide approval for all assessment activities, review results at the end of each assessment cycle, and ensure compliance. Direct the implementation of assessment methodology modifications, and solicit input from other oversight personnel on potential venues for improving the assessment process.
<i>Director of Graduate Studies</i>	Identify evolutionary changes in the program and suggest possible modifications to the assessment plan as needed to accurately reflect the most current version of the program. Suggest to the Department Chair changes that may be necessary to improve the department's ability to more successfully meet the learning outcomes.
<i>SACS and ABET Coordinator</i>	Implement all aspects of the assessment program. Analyze the assessment results at the end of each assessment cycle. Prepare all reporting documentation. Suggest to the Department Chair changes that may be necessary to improve the department's ability to more successfully meet the learning outcomes. Departmental dissemination of the plan's implementation requirements and of cyclical modifications. Liaison role with the College of Engineering.
<i>Graduate Academic Adviser</i>	Responsible for the distribution and collection of the measurement tool.

## Figure 1. University of Florida Graduate/Professional Program Assessment Plan Review Rubric

Related resources are found at <http://www.ua.assessment.edu>

Program:		Year:			
Component	Criterion	Rating			Comments
		Met	Partially Met	Not Met	
<b>Mission Statement</b>	Mission statement is articulated clearly.				
	The program mission clearly supports the College and University missions, and includes specific statements describing how it supports these missions.				
<b>Student Learning Outcomes (SLOs) and Assessment Measures</b>	SLOs are stated clearly.				
	SLOs focus on demonstration of student learning.				
	SLOs are measurable.				
	Measurements are appropriate for the SLO.				
<b>Research</b>	Research expectations for the program are clear, concise, and appropriate for the discipline.				
<b>Assessment Map</b>	The Assessment Map indicates the times in the program where the SLOs are assessed and measured.				
	The Assessment Map identifies the assessments used for each SLO.				
<b>Assessment Cycle</b>	The assessment cycle is clear.				
	All student learning outcomes are measured.				
	Data is collected at least once in the cycle.				
	The cycle includes a date or time period for data analysis and interpretation.				
	The cycle includes a date for planning improvement actions based on the data analysis.				
	The cycle includes a date for dissemination of results to the appropriate stakeholders.				

University of Florida Graduate/Professional Program Assessment Plan Review Rubric, continued.

Component	Criterion	Rating			Comments
		Met	Partially Met	Not Met	
<b>Measurement Tools</b>	Measurement tools are described clearly and concisely.				
	Measurements are appropriate for the SLOs.				
	Methods and procedures reflect an appropriate balance of direct and indirect methods.				
	The report presents examples of at least one measurement tool.				
<b>Assessment Oversight</b>	Appropriate personnel (coordinator, committee, etc.) charged with assessment responsibilities are identified				