

Department of Chemistry Assessment Plan for the MSCE/MCE

The Master's in Science in Chemistry Education (MSCE) and the Master's in Chemistry Education (MCE) are professional degrees designed to improve the content and pedagogical knowledge of teachers of chemistry who already possess a bachelor's degree in Chemistry. The goals for the programs are similar as the differences in the program are 1) the students' undergraduate preparation and 2) the number of chemistry content courses required which are different by 1 (1 more for the MSCE, with 1 more Chemistry Education course for the MCE). The Assessment Plan for the MSCE/MCE follows six Program Goals. For each Program Goal, there are one or more Outcome Measures.

PROGRAM GOAL 1: Graduate of the program will have both the theoretical and practical knowledge and skills necessary to learn and interpret current chemistry knowledge appropriate for the secondary school classroom.

Outcome Measures	Data Needed	Group	Assessment: Method	Reporting	Assessment Benchmarks
Understanding of chemistry content required for all high school chemistry student.	Demonstration of working knowledge	MCE/MSCE students	Pre/post program content test validated to align with	Reggienet site for collection of pre/post scores, sent to new students and graduating students each semester	Improved score on pre/post-test for all students. (Paired sample t-test)
Understanding of key concepts in: <ul style="list-style-type: none"> Organic chemistry Inorganic chemistry Biochemistry And how they apply to their secondary classes.	Evidence of connections between graduate course work and their teaching practice	Students in: <ul style="list-style-type: none"> CHE 350 CHE 380A64 CHE380A59 Or new online content courses 	1- Self-reported reflection by teachers on course evaluation questions (Q1a, Q2) 2- Post and 1 yr later survey questions (Q28, Q29)	End of Semester survey distributed online by Chair and data collected through Qualtrics Survey distributed by Director of Chem Ed and data collected in Qualtrics. Post survey sent when graduate, 1- year later survey sent each May.	Q1a- Likert Scale average above 4.0 (agree) on a 5pt scale. Q2- 70% of students provide an example 75% of respondents provide a specific example of the use of course content in their teaching.

PROGRAM GOAL 2: Graduate of the program will have both the theoretical and practical knowledge and skills necessary to be conversant in the historical, philosophical, organizational, and current research issues in chemistry and science education.

Outcome Measures	Data Needed	Group	Assessment: Method	Reporting	Assessment Benchmarks
Discuss recent research literature in connection with their classroom teaching	Papers/projects connecting research and teaching	Students in: CHE 402	Assessment rubric for Final project in CHE 402	Instructors of CHE 402 through Qualtrics Survey link sent by the Director of Chem Ed or Chair	90% of students in the course will receive a 42.5 out of 50 or better on the final paper (not peer review)
Review current research literature	Literature Review	Students in: CHE 482 or TCH 482	Action Research Rubric (Q8b)	Instructors of CHE 482 or TCH 482 through Qualtrics Survey link sent by the Director of Chem Ed or Chair	Average on Rubric of a 2.5 or higher.

PROGRAM GOAL 3: Graduate of the program will have both the theoretical and practical knowledge and skills necessary to develop and improve* their teaching practice for the continual education, growth, and understanding of all chemistry students.

Outcome Measures	Data Needed	Group	Assessment: Method	Reporting	Assessment Benchmarks
Discuss recent research literature in connection with their classroom teaching	Papers/projects connecting research and teaching	Students in: CHE 401A03, 401A05, 401A06	Assessment rubric for Final project in CHE 401A03, 401A05, 401A06	Instructors of CHE 401 through Qualtrics Survey link sent by the Director of Chem Ed or Chair	90% of students in the course will receive a 85% or better on projects indicated
Teachers use research-based, best practices in their classroom teaching	Use of reform-based best classroom practices for science teaching	Students in online courses	1- Self-reported reflection by teachers on course evaluation questions (Q1a, Q1h, Q1i., Q1j)	End of Semester survey distributed online by Chair and data collected through Qualtrics	Likert Scale average above 4.0 (agree) on a 5pt scale.
		MCE/MSCE students	2- Pre/Post and 1 yr later survey questions (Q21, Q22)	Survey distributed by Director of Chem Ed and data collected in Qualtrics when start the programs. Post survey sent when graduate, 1- year later survey sent each May.	Increased reported rates (t-test) for 50% of the graduate for Q21 and Q22 on reform-based practices from pre to post or 1 year later survey.

* Improve means to align teaching with current best practices for teaching chemistry/science as supported by the research literature, American Chemical Society (ACS), National Science Teachers Association (NSTA), and the Next Generation Science Standards (NGSS).

PROGRAM GOAL 4: Graduate of the program will have both the theoretical and practical knowledge and skills necessary to take leadership roles facilitating the success of other science/chemistry teachers..

Outcome Measures	Data Needed	Group	Assessment: Method	Reporting	Assessment Benchmarks
<p>Abilities to share knowledge with colleagues and others</p> <p>Abilities to hold teacher-leadership roles.</p>	<p>Instances of shared knowledge/ learning with colleagues</p> <p>Leadership position of students before and after the program</p>	<p>Students in: Online MCE/MSCE courses offered by CHE</p> <p>MCE/MSCE students</p>	<p>Self-reported reflection by teachers on course evaluation questions (Q1f, Q1g, Q1h)</p> <p>Pre/Post and 1 yr later survey questions (Q22, Q23, Q24, Q27)</p>	<p>End of Semester survey distributed online by Chair and data collected though Qualtrics</p> <p>Survey distributed by Director of Chem Ed when start program and data collected in Qualtrics. Post survey sent when graduate, 1- year later survey sent each May.</p>	<p>Q1f,g,h- Likert Scale at 4.0 (agree) on a 5 point scale.</p> <p>Increase of 50% from pre to 1-yr on Q23, Increased number of roles list on Q24 by 50% overall all off which are curriculum/teaching related</p>

PROGRAM GOAL 5: Graduate of the program will have both the theoretical and practical knowledge and skills necessary to develop a series of action research projects aimed at identifying strengths and weaknesses in classroom instruction and process of continual improvement*.

Outcome Measures	Data Needed	Group	Assessment: Method	Reporting	Assessment Benchmarks
<p>Creation of Formal research projects related to chemistry teacher instruction</p> <p>Action research projects identify methods for improvement of teaching</p>	<p>Topics and content of Action research projects</p> <p>Teachers reports of the impact of action research project on teaching practice.</p>	<p>Students in CHE 482 or TCH 482</p>	<p>Action Research Project Rubric (Q2 Q3)</p> <p>Action Research Project Rubric (Q6 Q8d)</p>	<p>Rubric will be completed through Qualtrics by Instructor of CHE 482 each Fall and requested of instructor of TCH 482 each Spring. Chair or Director of Chem Ed will ask instructors to complete it with link.</p>	<p>90% of the Action Research Topics relate to teaching and classroom Instruction (Q3)</p> <p>90% of authors indicate changes to future practice (Q6)</p> <p>Projects average a 2.5 on Q8d</p>

*Improve means to align teaching with current best practices for teaching chemistry/science as supported by the research literature, American Chemical Society (ACS), National Science Teachers Association (NSTA), and the Next Generation Science Standards (NGSS).

PROGRAM GOAL 6: Graduate of the program will have both the theoretical and practical knowledge and skills necessary to assess, evaluate, and improve* chemistry education in secondary schools.

Outcome Measures	Data Needed	Group	Assessment: Method	Reporting	Assessment Benchmarks
<p>Create and carryout Action Research projects to improve teaching</p> <p>Change/improve practice based on identified areas for improvement</p>	<p>Action research projects and details of the project (topic, success, impact on classroom)</p> <p>Classroom teaching practices</p>	<p>Students in CHE 482 or TCH 482</p> <p>MCE/MSCE Students</p>	<p>Action Research Project Rubric</p> <p>Post and 1 yr later survey questions (Q41, Q36, Q38, Q39)</p>	<p>Rubric will be completed through Qualtrics by Instructor of CHE 482 each Fall and requested of instructor of TCH 482 each Spring. Chair or Director of Chem Ed will ask instructors to complete it with link.</p> <p>Survey distributed by Director of Chem Ed when and data collected in Qualtrics. Post survey sent when graduate, 1-year later survey sent each May.</p>	<p>Projects average a 2.5 in each category</p> <p>50% of respondents provide a specific example of change in their teaching. 25% report continued use of data collection/assessment techniques</p>

*Improve means to align teaching with current best practices for teaching chemistry/science as supported by the research literature, ACS, NSTA, and NGSS.

DATA SUMMARY

The table below adds certain details to the “Data Needed” items and indicates the frequency of collection.

Data Needed	Already Available?	Timeline
Semester Course Evaluation Questions	YES	Every semester
Pre MCE/MSCE Program Survey	YES	When Students Admitted
Post MCE/MSCE Program Survey	INCOMP	Semester of Graduation
Alumni (1-year later) MCE/MSCE Program Survey	No	Spring semester
Action Research Project Rubric	YES	End of CHE 482
Chemistry Content Test: Pre- and Post – test scores	No	Admission and Graduation Semesters
Course Project Scores	SOME	End of CHE 401.03, 401.05, CHE 401.06, and CHE 402

YES means will have data by end of Summer 2018

SOME indicates not all courses reports

INCOMP indicates that we only have post survey data for students without the Pre data to align it to .

ANALYSIS AND RESPONSE TIMELINE

- June 1 Chair reviews submitted data and requests any missing or incomplete items from the prior academic year.
- September 1 Chair and Director of Chemistry Education analyze the collected data, creating a summary of data and indicating areas of concern, including any areas of lingering shortfall and/or lack of progress from the prior year's Assessment cycle and action plan.
- October 1 Where there is a substantial shortfall and lack of progress, the Chair and Director of Chemistry Education will formulate an action plan, which may involve review and change in courses, curricula, facilities, faculty effort, and so on. Action plan will be implemented.
- March 1 Chair submits Assessment Report to University Assessment Office.
- May 1 Action plan and responses included in the Department's Annual Report which is distributed to faculty.