MSE with Emphasis in Chemistry
Proposed New Course Draft Descriptions & Objectives

CHEM 821 Laboratory Development Project in Chemical Education I

Course Description: The first of a capstone sequence for the MSE degree. The course goal will be to apply the principles from prior MSE coursework to develop challenging and innovative laboratory experiences at the college level. Students will work independently with consultation guidance from the chemistry faculty. The outcome of the course will be the development of new laboratory exercises which will be presented to and shared among course participants. Eight week summer course with a required two week on-campus experience. Prerequisites: CHEM 880 and any two of the following courses: CHEM 632, 634, 644, 646, 656, 662, 664, or 666.

Course Objectives and Topics: The focus of this course is for you to apply the chemical principles and pedagogical strategies that you have learned so far in the MSE degree program to develop new laboratory experiences for your students. Course objectives are to:

- Develop new laboratory experiences at the college level that contain challenging content and innovative pedagogy.
- Write student materials (introductory reading, procedures, assignments) and ancillaries (preparation instructions, instructor's notes) in sufficient detail and quality that they are able to be used by fellow instructors without modification.
- Give a 15 minute presentation to your peers utilizing distance learning technology which summarizes the chemistry content and pedagogical features of your laboratory experience.

CHEM 822 Laboratory Development Project in Chemical Education II

Course Description: The second of a capstone sequence for the MSE degree. Continuation of the laboratory development activities in CHEM 821. Prerequisites: CHEM 821 and any four of the following courses: CHEM 632, 634, 644, 646, 656, 662, 664, or 666.

CHEM 823 Research Investigations in Chemistry for Teachers I

Course Description: The first of a capstone sequence for the MSE degree. The course goal will be to engage MSE degree students in the research of discovery in the chemistry laboratory. Students will participate in the hands-on research project of a FHSU Chemistry faculty member. The outcome of the course will be a first-hand experience of the practice of chemical research. Eight week summer course with a required two week on-campus experience. Prerequisites: completion of any two of the following courses: CHEM 632, 634, 644, 646, 656, 662, 664, or 666.

Course Objectives and Topics: The focus of this course is for you to engage in the practice of chemical research through participation in the research project of an FHSU chemistry faculty member. Course objectives are to:

- Conduct in-depth literature research on primary source materials in the student's chosen research topic.
- Engage in hands-on laboratory research during a two week on-campus experience under the guidance of an FHSU chemistry faculty member.
- Write a professional research report which describes the background of your research topic, the experimental methods utilized, and your research contributions.
- Give a presentation to your peers utilizing distance learning technology which summarizes the background of your research topic, the experimental methods utilized, and your research contributions.

CHEM 824 Research Investigations in Chemistry for Teachers II

Course Description: The second of a capstone sequence for the MSE degree. Continuation of the research investigations of CHEM 824. Prerequisites: CHEM 823 and any four of the following courses: CHEM 632, 634, 644, 646, 656, 662, 664, or 666.

CHEM 880 Chemistry Education Research & Literature

Course Description: This course provides a survey of the major developments and trends in the field of chemistry education, focusing on how chemistry can be taught more effectively in the classroom and laboratory as described in the literature. This course also introduces Chemistry Education Research (CER) as a specific area of Discipline-based Education Research (DBER) and guides students to complete a literature review on the contributions of CER toward a specific topic related to chemistry teaching. Prerequisites: CHEM 801 (Introduction to Graduate Studies in Chemistry), AEP 803 (Educational Research), and AEP 858 (Data Analysis and Assessment)

Course Objectives and Topics:

- Introduce and discuss several predominant theories of chemistry learning
- Introduce Chemistry Education Research (CER) as a specific area of Discipline-based Education Research (DBER)
- Familiarize students with the literature of chemistry education by reading and reflecting critically on a number of significant books, documents, journal articles, and other publications in chemistry education in the past decade or so
- Provide a platform for addressing current issues in chemistry teaching under the mentorship of a faculty
- Help students understand how CER may facilitate more effective chemistry learning