

# ILLINOIS STATE UNIVERSITY

## GRADUATE PROGRAMS

### Program Proposal Financial Implications Form

*For Request for New Program Approval*

**Purpose:** Proposed new graduate programs (degrees, sequences, certificates) must include information concerning how the program will be financially supported to proceed through the curriculum proposal process. Signatures of the College Dean and Provost/Provost Representative are required prior to submission of the new program to the College Curriculum Committee.

**Procedure:** This completed form, with all necessary signatures, is to be attached to new program curricular proposals.

**Definition:** A "program" at the graduate level can be either a degree, a sequence as part of a degree, or a graduate-level certificate (Graduate Certificate, Post-Baccalaureate Certificate, or Post-Master's Certificate).

*Complete the following information:*

Department: Chemistry Date: 2-18-2008

Proposed New Program: Master of Chemistry Education

Person Completing Form: William Hunter Contact #: whunter@ilstu.edu 87905

Complete Table I to show student enrollment projections for the program.

Table I

STUDENT ENROLLMENT PROJECTIONS FOR THE NEW PROGRAM

	1 <sup>st</sup> Year (July – June)	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> Year	6 <sup>th</sup> Year
Number of Program Majors (Fall headcount)	24	24	24	24	24	24
Annual Full-Time-Equivalent Majors	8	8	8	8	8	8
<u>Annual</u> Credit Hours in EXISTING Courses <sup>1</sup>	<del>0</del> 88	<del>0</del> 88	<del>0</del> 88	<del>0</del> 88	<del>0</del> 88	<del>0</del> 88
Annual Credit Hours in NEW Courses <sup>1</sup>	0	0	0	0	0	0
Annual Number of degrees Awarded	0	0	18	2	0	18

<sup>1</sup>Include credit hours generated by both majors and non-majors in courses offered by the academic unit directly responsible for the proposed program.

$$33 \text{ credit hrs} \div 3 \text{ yrs} = 11 \text{ credits per year}$$

$$11 \times 8 \text{ FTE} = 88$$

Proposed New Program: Master of Chemistry Education

Complete Table II (even if no new funding is requested). Show all required resources including amounts and sources of funds reallocated from other programs or units.

Table II

PROJECTED RESOURCE REQUIREMENTS FOR THE NEW PROGRAM

	1 <sup>st</sup> Year (July - June)	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> Year	6 <sup>th</sup> Year
FTE Staff <sup>1</sup> (FTE)						
Summer teaching of 1 course	0.17 <sup>a</sup>	0.17 <sup>a</sup>	0.17 <sup>a</sup>	0.17 <sup>b</sup>	0.17 <sup>b</sup>	0.17 <sup>b</sup>
Academic year for 1 course	0.17 <sup>a</sup>	0.17 <sup>a</sup>	0.17 <sup>a</sup>	0.17 <sup>c</sup>	0.17 <sup>c</sup>	0.17 <sup>c</sup>
Personnel Services ( \$ )	\$500	\$500	\$500	\$500	\$500	\$500
Clerical , copying, services						
Equipment and Instructional Needs ( \$ )	0	0	0	0	0	0
Library ( \$ )	0	0	0	0	0	0
Other Support Services <sup>2</sup> ( \$ )	\$7500 <sup>a</sup> or	\$7500 <sup>a</sup>	\$7500 <sup>a</sup>	0	0	0
Distance Education Course Development	0.17FTE	0.17FTE	0.17FTE			

<sup>1</sup>Reflects the number of FTE staff to be supported with requested funds. Not a dollar entry.

<sup>2</sup>Other dollars directly assigned to the program. Do not include allocated support services.

<sup>a</sup>Grant supported during the 1st three years by the US DoEd, ISBE, IMSP grant.

<sup>b</sup>Supported through ISU's summer instruction program - contract course or perm \$

<sup>c</sup>Department will allocate 0.17FTE of the Director of Chemical Education in summer allocation

Budget narrative listing projected sources of program funding (including sources of reallocated funds).

FTE Staff - For Years 1, 2, 3 this new degree is grant supported. In Years 4,5,6 and beyond, the degree will require 1 course per semester supported by the university. Table II describes only the costs of the originating (Chemistry) department. For Curriculum & Instruction, the cost is likely to be 0.28 FTE or 1.67 courses per year.

*Chemistry & CEI - reallocation of funds*

Personnel Services - 50 hours @ \$10 per hour per year in copying from Chemistry department budget.

Equipment, Library, Other Support Services - no additional costs.

## **Graduate Degree Proposal: Master of Chemistry Education**

A new graduate program leading to a new professional master's degree which provides conceptual knowledge and skills required for professional practice. The new degree, Master of Chemistry Education, is proposed as a means to meet crucial and on-going needs for the State of Illinois and for the nation. The goal is to take current science teachers who teach chemistry but with a weak background in chemistry and improve both their content knowledge and pedagogical knowledge so that they can improve the chemistry knowledge of their students. Implementation of the program can be accomplished within existing courses, facilities and resources, but in the future more-tailored course offerings may be proposed.

### **The Need for a New Graduate Program in Chemistry Education**

Increasing the knowledge and skills of math and science teachers in their field(s) of specialization is a priority identified in studies and reports from the National Science Foundation, the US Department of Education, the Illinois State Board of Education, and the Illinois Board of Higher Education. For instance, Title II, Part B, Sections 2201-2203, of the No Child Left Behind Act of 2001 (NCLB) authorized the Mathematics and Science Partnerships (MSP) Program to improve teacher quality and to increase the academic achievement of students in mathematics and science. The primary means for achieving the MSP objectives are through enhancing the content knowledge and teaching skills of classroom teachers. This implies having new training opportunities for practicing teachers.

There are hundreds of teachers in Illinois who teach chemistry with only a small number of chemistry courses in their college education, sometimes only General and Organic Chemistry, and virtually no chemical pedagogy courses. Often, these are biology teachers and physics teachers whose school district calls on them to teach the first high school chemistry course. Increasing the chemical knowledge of such teachers and providing them with the pedagogical tools for effective presentation of chemistry concepts is a direct approach to improving classroom outcomes of high school chemistry students. Furthermore, this has a strong potential to increase both the quantity and quality of students continuing to study chemistry.

ISU is in an excellent position to meet this need through the implementation of a new degree specifically aimed at improving the chemistry content and chemical pedagogy of in-service math and science teachers.

### **Other Similar Degree Programs**

Below is a sampling of other institutions which have similar degree programs. They include a range of credit hours from 30-41, with a similar mixture of chemistry content, and science education. ISU has more Chemical Education offerings than other institutions.

	Indiana MAT- Chemistry	UMass- Dartmouth	SUNY- Stoneybrook MAT-Chem	Penn MCEP	Texas A&M MS ChemEd

Chemistry Content	20 hours at our 300 and 400 level	15 hrs	15	24	12
ChemEd Content	0	0			
Science Education or Other Content	Up to 16	15	20	6	18
Research	Thesis and non-thesis option Written or oral exam	Non-Thesis	6 hours student teaching	Non thesis	Thesis and non-thesis options
Total Credit Hours	36	30	41	30	36
Other Reqs.	Outreach and Teaching in Dept.				

### Description of the New Degree Program

Completion of the program for a Master of Chemistry Education would mean completion of 33 hours of coursework in three areas: Chemistry Content, Chemistry Education and Science Education. It would also require a continuing and capstone classroom Action Research project. Our existing courses would satisfy the requirements. Some of the courses would be designed or modified to become distance-learning courses. The specific requirements and the list of new courses can be arranged among the three areas of the program.

DEGREE REQUIREMENTS IN THE AREA OF CHEMISTRY CONTENT: Completion of any three courses totaling 9 credit hours from the following:

- CHE 315 Instrumental Analysis
- CHE 350 Inorganic Chemistry
- CHE 342 General Biochemistry I
- CHE 380.11 Structure Determination in Chemistry
- CHE 380.41 Enzymes (Biological Catalysts)
- CHE 380.52 Homogeneous Catalysis
- CHE 380.53 Inorganic Biochemistry
- CHE 380.54 Carbohydrates
- CHE 388 Chemistry of Energy Production
- Any CHE 380.xx or CHE 400 level course in Inorganic, Organic, Analytical, Physical, or Biochemistry for which the student has appropriate prerequisites.
- No credit for ISU courses in which students have an equivalent course already.

DEGREE REQUIREMENTS IN THE AREA OF CHEMISTRY EDUCATION: Completion of each of three courses (3 credit hours each – 9 cr. hrs).

- CHE 380.48 Advanced Chemistry: Curriculum & Pedagogy
- CHE 432 Leadership in Chemical Education
- CHE 433 Developing Practices in Chemical Education

DEGREE REQUIREMENTS IN THE AREA OF SCIENCE EDUCATION: Completion of three courses (3 credit hours each).

Foundational Educational and Pedagogical Courses

(3 courses required – 9 cr. hrs)

- C&I 401 Instructional Media And Technology
- C&I 450 Curriculum In Science Education
- C&I 451 Recent Research In Science Education
- C&I 453 Instructional Strategies For School Science

DEGREE REQUIREMENTS IN THE AREA OF ACTION RESEARCH (6 cr. hrs)

- C&I 481: Professional Research (3 cr. hrs.) Study of teacher-initiated research and design of a curricular or instructional design project in an educational setting.
- C&I 482: Professional Research II (3 cr. hrs.) Conduct and present a curricular or instructional research project in an educational setting.

The degree would not lead to initial certification as a teacher, as the target teachers are already certified within Illinois. This degree would, however, lead to an endorsement in Science: Chemistry. (Our current BS Chemistry teacher certification candidates receive the Science: Chemistry Endorsement and Designation, whereas those from Biology and Physics receive Science: Biology and Science: Physics; respectively)

This degree is designed for in-service full-time teachers, and hence their time on campus is limited to the summers only. We anticipate spreading the coursework across three years and three summers; likely one course per semester and one in the summer.

### **Costs of the Degree Program**

The attached Program Proposal Financial Implications Form details the costs associated with the new program. There primary cost is for the instructors of the courses. Because we anticipate teaching one course at a time, with a cohort, and because we anticipate the use of existing courses, the real cost to the university is 1 course per semester.

### **Support from the College of Education and the Department of Curriculum & Instruction**

Please see the attached letters from the Dean of the College of Education and the Chair of the Department of Curriculum & Instruction.

## Catalog Copy

### Old Catalog Copy

#### Master's Degree in Chemistry

The department offers a single, thesis-based M.S. degree requiring 32 credit hours. Four formal hours each in Chemistry 490 (Research) and Chemistry 499 (Thesis) are required as part of the 32 hour program, although most students will register for more than the total of eight formal hours while pursuing the degree. Students select a research adviser and work closely with that faculty member to complete a thesis based upon original research. Upon completion of a written thesis, a final oral examination/thesis defense is required.

The program is broad-based. It allows students to specialize in any of the subdisciplines (physical, organic, inorganic, analytical, biochemistry, or chemical education), although course work is required in at least four areas. The requirements to complete the M.S. degree include 22 hours of 400 and/or 300 level courses including a minimum of 12 credit hours of courses at the 400 level. Two hours of credit in Seminar (Chemistry 492) are also required.

#### Admission Requirements

To be admitted to the master's program a student must have at least a 2.8 GPA (on a scale in which A equals 4) for the last 60 hours of undergraduate work. The Department considers GRE scores for granting assistantships. Results of the General Test of the Graduate Record Examination should be sent to the Department's Graduate Program Director. A minimum TOEFL score of 600 (250 for computer-based testing) is recommended for international students to be considered for admission to the program.

### New Catalog Copy (changes underlined)

#### Master's Degrees in Chemistry

The department offers a two (three) Master's degrees: MS Chemistry, (MS Chemistry Education), and Master of Chemical Education. The MS Chemistry is a thesis-based M.S. degree requiring 32 credit hours. Four formal hours each in Chemistry 490 (Research) and Chemistry 499 (Thesis) are required as part of the 32 hour program, although most students will register for more than the total of eight formal hours while pursuing the degree. Students select a research adviser and work closely with that faculty member to complete a thesis based upon original research. Upon completion of a written thesis, a final oral examination/thesis defense is required.

The program is broad-based. It allows students to specialize in any of the subdisciplines (physical, organic, inorganic, analytical, biochemistry, or chemical education), although course work is required in at least four areas. The requirements to complete the M.S. degree include 22 hours of 400 and/or 300 level courses including a minimum of 12 credit hours of courses at the 400 level. Two hours of credit in Seminar (Chemistry 492) are also required.

#### Admission Requirements

To be admitted to the MS Chemistry program a student must have at least a 2.8 GPA (on a scale in which A equals 4) for the last 60 hours of undergraduate work. The Department considers GRE scores for granting assistantships. Results of the General Test of the Graduate Record Examination should be

sent to the Department's Graduate Program Director. A minimum TOEFL score of 600 (250 for computer-based testing) is recommended for international students to be considered for admission to the program.

science and/or math. A minimum TOEFL score of 600 (250 for computer-based testing) is recommended for international students to be considered for admission to the program.

### **Master of Chemistry Education**

The Master of Chemistry Education is a professional degree designed to improve the content and pedagogical knowledge of teachers of chemistry without a BS Chemistry. The degree requires 33 credit hours of coursework in three areas: Chemistry Content, Chemistry Education and Foundational Science Education. It would also require a continuing and capstone classroom Action Research project. By the time of final degree awarding, a candidate must have completed three years of full-time teaching.

Chemistry Content: 9 credit hours from the following: CHE 315, 350, 342, 360, 380.11, 380.41, 380.52, 380.53, 380.54, 388. Any CHE 380.xx or CHE 400 level course in Inorganic, Organic, Analytical, Physical, or Biochemistry for which the teacher has appropriate prerequisites. No credit for ISU courses in which students have an equivalent course already.

Chemistry Education: 9 credit hours from the following: CHE 380.48, 432, 433.

Science Education: 9 credit hours from the following: C&I 401, 450, 451, 453.

Action Research: 6 credit hours: C&I 481, 482.

### **Admission Requirements**

To be admitted to the MCE program a student must have at least a 2.8 GPA (on a scale in which A equals 4) for the last 60 hours of undergraduate work. The candidate must hold (or be eligible for) a valid certificate to teach