

LSC Use Only Proposal No: _____ UWUCC Use Only Proposal No: 12-86d
 LSC Action-Date: _____ UWUCC Action-Date: AP-4/9/13 Senate Action Date: App-4/30/13

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) Ronald See	Email Address rfsee@iup.edu
Proposing Department/Unit Chemistry	Phone 7-4489

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

- New Course Course Prefix Change Course Deletion
 Course Revision Course Number and/or Title Change Catalog Description Change

Current course prefix, number and full title: _____
 Proposed course prefix, number and full title, if changing: _____

2. Liberal Studies Course Designations, as appropriate

- This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)
 Learning Skills Knowledge Area Global and Multicultural Awareness Writing Intensive (include W cover sheet)
 Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)
 Global Citizenship Information Literacy Oral Communication
 Quantitative Reasoning Scientific Literacy Technological Literacy

3. Other Designations, as appropriate

- Honors College Course Other: (e.g. Women's Studies, Pan African)

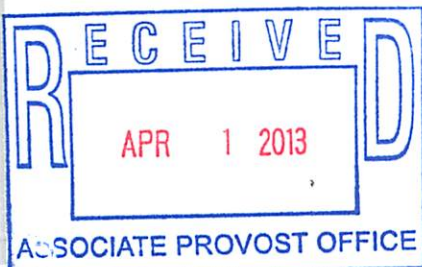
4. Program Proposals

- Catalog Description Change Program Revision Program Title Change New Track
 New Degree Program New Minor Program Liberal Studies Requirement Changes Other

Current program name: Bachelor of Science in Education - Chemistry

Proposed program name, if changing: _____

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)	<i>[Signature]</i>	4/12/12
Department Chairperson(s)	<i>[Signature]</i>	4/12/12
College Curriculum Committee Chair	<i>[Signature]</i>	4/20/12
College Dean	<i>[Signature]</i>	5/13/12
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)	<i>[Signature]</i>	4/21/13
Additional signature (with title) as appropriate	<i>Edel Reilly, TECC</i> / <i>E. Nardi</i>	3/25/13
UWUCC Co-Chairs	<i>Gail S. Sedquist</i>	4/9/13



Received
 MAR 29 2013
 Liberal Studies

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 FEB 14 2013
 Liberal Studies

Part II. Description of Curriculum Change

Bachelor of Science in Education - Chemistry

Liberal Studies: As outlined in the Liberal Studies section with the following specifications: Mathematics: MATH 125 Natural Sciences: PHYS 111-112 and 121-122 or 131-141 and 132-142 Social Science: PSYC 101 Liberal Studies Elective: 3cr, MATH 126, no courses with CHEM prefix		44
College of Education: Preprofessional Education Sequence:		31
COMM 103	Digital Instructional Technology	3
EDSP 102	Educational Psychology	3
Professional Education Sequence:		
EDEX 301	Education of Students with Disabilities in Inclusive Secondary Settings	2
EDEX 323	Instruction of English Language Learners with Special Needs	2
EDSP 477	Assessment of Student Learning: Design and Interpretation of Educational Measures	3
EDUC 242	Pre-Student Teaching Clinical Experience I	1
EDUC 342	Pre-Student Teaching Clinical Experience II	1
EDUC 441	Student Teaching	12
EDUC 442	School Law	1
EDUC 451	Teaching Science in the Secondary School	3
Major: Required Courses:		36-37
CHEM 111 (General Chemistry I) or CHEM 113 (Advanced General Chemistry I)		4
CHEM 112 (General Chemistry II) or CHEM 114 (Advanced General Chemistry II)		4
CHEM 214	Intermediate Inorganic Chemistry	3
CHEM 231	Organic Chemistry I	4
CHEM 232	Organic Chemistry II	4
CHEM 325	Analytical Chemistry I	4
CHEM 341	Physical Chemistry I	4
CHEM 343	Physical Chemistry Laboratory I	1
CHEM 390	Chemistry Seminar II (1)	1
CHEM 498	Problems in Chemistry (1,2)	1
Controlled Electives:		
BIOC 301 or CHEM 351		3-4
At least 3cr additional CHEM or BIOC at or above the 300-level (2)		3
Other Requirements:		8
BIOL 111	Principles of Biology I	4
GEOS 201	Foundations of Geology	4
Free Electives: (1)		0-1
Total Degree Requirements:		120

- (1) Program contains one writing-intensive course (CHEM 343), students need to acquire another W-course in Liberal Studies or as an elective.
- (2) Students in the chemistry education track who wish to earn an ACS-certified degree in chemistry must take two credits of CHEM 498, including a written report, and complete at least 7cr, including two lab courses, of CHEM or BIOC at or above the 300-level.

Appendix A – Suggested Sequence for the B.S. in Education – Chemistry

Side-by-side comparison

Present		Proposed			
Bachelor of Science in Education - Chemistry					
Liberal Studies: Mathematics: MATH 125 Natural Sciences: PHYS 111-121 & 112-122 Social Science: Liberal Studies Elective: 3cr, MATH 126	44	Liberal Studies: Mathematics: MATH 125 Natural Sciences: PHYS 111-121 & 112-122 or 131-141 & 132-142 Social Science: PSYC 101 Liberal Studies Elective: 3cr, MATH 126	44		
Education Sequence:	29	Education Sequence:	31		
Required Courses	32	Required Courses	36-37		
CHEM 113	Concepts in Chem I	4	CHEM 111 or CHEM 113	4	
CHEM 114	Concepts in Chem II	4	CHEM 112 or CHEM 114	4	
CHEM 214	Inter. Inorganic Chem	2	CHEM 214	Inter. Inorganic Chem	3
CHEM 231	Organic Chem I	4	CHEM 231	Organic Chem I	4
CHEM 232	Organic Chem II	4	CHEM 232	Organic Chem II	4
CHEM 321	Quantitative Analysis	4	CHEM 325	Analytical Chemistry I	4
CHEM 341	Physical Chem I	4	CHEM 341	Physical Chem I	4
CHEM 343	Physical Chem I Lab	1	CHEM 343	Physical Chem I Lab	1
			CHEM 390	Chemistry Seminar II	1
CHEM 499	Prob. in Chem. Education	1	CHEM 498	Problems in Chemistry	1
Controlled Electives		Controlled Electives			
			BIOC 301 or CHEM 351	3-4	
	at least 4cr from the list: CHEM 322, 342, 344, 351, 410, 411, BIOC 301, 311	4	At least 3cr additional CHEM or BIOC at or above the 300-level	3	
Other Requirements		8	Other Requirements	8	
BIOL 111	Principles of Biology I	4	BIOL 111	Principles of Biology I	4
GEOS 111 or 113		3	GEOS 201	Foundations of Geology	4
GEOS 112 or 114		1			
Free Electives		7	Free Electives	0-1	
Total Degree Requirements		120	Total Degree Requirements	120	

Changes in course offerings

New courses:

CHEM 325 – Analytical Chemistry I (approved at Senate, replaces CHEM 321)
CHEM 390 – Chemistry Seminar II (approved at Senate)

Existing courses new to the program:

CHEM 111 – General Chemistry I
CHEM 112 – General Chemistry II
CHEM 351 – Biochemistry
CHEM 498 – Problems in Chemistry (replaces CHEM 499)
BIOC 301 – Fundamentals of Biochemistry
GEOS 201 – Fundamentals of Geology

Deleted courses:

CHEM 321 – Quantitative Analysis
CHEM 499 – Problems in Chemical Education

Revised Courses:

CHEM 214 – Intermediate Inorganic Chemistry (approved at Senate 10/9/12)
CHEM 231 – Organic Chemistry I (approved at Senate 10/9/12)
CHEM 232 – Organic Chemistry II (approved at Senate 12/4/12)
CHEM 341 – Physical Chemistry I (approved at Senate 5/1/12)

Re-named and revised courses:

CHEM 113 – Advanced General Chemistry I (formerly Concepts in Chemistry I, approved at Senate 4/17/12)
CHEM 114 – Advanced General Chemistry II (formerly Concepts in Chemistry II, approved at Senate 4/17/12)

Courses in old program that no longer exist:

GEOS 111, 112, 113 and 114

Rationale for Changes

1. Response to curriculum changes outside chemistry – Several courses still listed in the B.S. Chemical Education degree program no longer exist, and so this new track updates the requirements in geoscience (GEOS 201). Also, the requirements of the Pre-professional and Professional Education sequences increased from 29 to 31cr, and we were able to accommodate this increase without going beyond 120 total hours.
2. Importance of Biochemistry to Chemistry – As the field of Chemistry evolves; the importance of biological applications continues to grow. Therefore, the department now feels that no student can realistically be said to have been educated in chemistry without taking a biochemistry course. Due to this reality, BIOC 301 (Biochemistry I) or CHEM 351 (Biochemistry) will now be required for the B.S. – Chemical Education Track.
3. Response to the reduction of Liberal Studies requirements – The changes in the Liberal Studies requirements have allowed us to add 4-5cr of chemistry to the degree program without exceeding 120 total hours. These changes allow the Chemical Education program to be very close to the requirements of the American Chemical Society Committee on Professional Training for approved degrees in chemistry. A student who chooses to take at least 7 additional credit hours of upper-level CHEM or BIOC coursework, and an additional credit of independent study/research, will qualify for the approved degree. We have included this possibility as a note in the degree program.
4. Independent study/research – The independent study/research requirement (CHEM 499) was added to the Chemical Education degree program in 2002. Since then, it has proved quite successful, but the chemistry faculty feels that the separation between CHEM 498 and CHEM 499 is artificial and unnecessary, and so the independent study/research requirement has been changed to CHEM 498, as in the other chemistry degree programs. Also, the faculty who have mentored students in 498 have commented that the students would have a more meaningful experience if they were better prepared. The new CHEM 390 is designed to fill this need, and has been added to the new chemistry education track.
5. Changes in General Chemistry – Based on tracking data for chemistry majors, we have decided to change CHEM 113 and 114 from a course reserved for Chemistry and Biochemistry majors to a course designed for advanced students of any major. Therefore, the Freshman Chemistry requirement has been changed to an option of 111/112 or 113/114. In reality, nearly half of our graduates in chemistry have historically taken CHEM 111 & 112, so formally including this option is more an admission of reality than an actual change in our program.

Part III. Implementation. Provide answers to the following questions:

1. How will the proposed revision affect students already in the existing program?

The courses required for the existing Chemistry B.S. program are either retained, or replaced by analogous new courses. Therefore, students will have the option of graduating under the old or new curriculum.

2. Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty.

Taken as a whole, the changes in the combined chemistry department proposals will result in a reduction of 8-9 workload hours taught by the chemistry department faculty, and two less preps. Therefore, the present faculty allotment of the chemistry department will continue to adequate, and less workload hours of temporary faculty will be required.

3. Are other resources adequate? (Space, equipment, supplies, travel funds)

The proposed changes will not introduce any additional strain on these resources.

4. Do you expect an increase or decrease in the number of students as a result of these revisions? If so, how will the department adjust?

The proposed revision is not expected to change the number of students in the program.

Part IV. Periodic Assessment

There are four components of assessment listed and described in the ACS-CPT's (American Chemical Society's Committee on Professional Training) Departmental Self-Evaluation Supplement. These are:

- 1) Review Mission, Goals and Objectives
- 2) Collect Data on Objectives
- 3) Analyze Data and Determine Changes
- 4) Implement Changes and Re-Evaluate

These principles of assessment apply to the development, data collection, analysis and changes in curriculum based on student learning outcomes. The student learning outcomes used in these assessment tools are based on the Characteristics of Student Competencies in Rigorous Undergraduate Programs described in the ACS-CPT supplement: Rigorous Undergraduate Chemistry Programs.

There are three components proposed for the periodic assessment of this degree program. One is a survey of the senior students completing the degree program, one is the Diagnostic of Undergraduate Chemical Knowledge (DUCK) exam provided by the American Chemical Society's Exam Institute, and the other is a five-year re-certification of the program by the

American Chemical Society's Committee on Professional Training (ACS CPT). The results from the questionnaires and DUCK exam will be examined and analyzed by the Curriculum Committee of the Department each year and the results reported to the faculty. The recommendations from the ACS CPT will also be reviewed and reported to the faculty. During each Five-year program review, the Curriculum Committee will then review all the data collected and determine what changes, if any, are needed in the program and recommend them to the Chemistry Department for action.

Senior Survey – A questionnaire will be given to students who are in the last semester of their degree program. This questionnaire will address the graduates' perceptions of whether they have achieved the program learning outcomes set by the Chemistry Department. It will also have the students indicate where they plan to go once they leave IUP and the strengths & weaknesses of the program.

DUCK Exam - Students in their last semester will be given the Diagnostic of Undergraduate Chemical Knowledge (DUCK) exam provided by the American Chemical Society's Exam Institute. The student's scores will be compared to the published national norms for this exam.

Five-year Review – The American Chemical Society evaluates the B.S. degree programs for certification every five years and requires an interim report every year. The Chemistry Department will carefully consider for implementation, the recommendations of the American Chemical Society Committee on Professional Training. The five-year ACS review is a thorough examination of program content by a uniquely qualified extramural agency. The review results in specific recommendations for improvement when weaknesses are detected. Students pursuing the B.S. in Education – Chemistry degree will have the option of an ACS-certified program, but may also get a non-certified degree. Additionally, this program shares all its chemistry courses with the ACS-certified B.S. degree, so recommendations to that program will also be used to help assess the quality of the B.A. degree program.

PDE Review – In addition to the above, the B.S. in Education – Chemistry degree program faces periodic review from the Pennsylvania Department of Education. This review ensures that the program meet the needs of prospective teachers both in their professional development as instructors, and the knowledge base of their academic specialty. The feedback from this review will also help to guide us in any future program revisions.

Part V. Course Proposals

CHEM 214 – Intermediate Inorganic Chemistry

CHEM 231 – Organic Chemistry I

CHEM 232 – Organic Chemistry II

CHEM 390 – Chemistry Seminar II

Part VI. Letters of Support or Acknowledgement

Ron: Thank you very much for sharing this information. As a Biochemistry Coordinator I discussed this request with faculty members Jon Southard and Jenna Villemain, who have taught BIOC 301 and BIOC 302 and are slated to teach in the future. The two concurred with the request. I also fully support the proposed program changes-- Thanks.

N. Bharathan PhD

Professor of Biology

Coordinator Biochemistry

Ron,

The Chemistry Ed proposal you attached for my review looks good. It contains all of the necessary requirements for Chemistry Education majors. The proposal has my support.

Joseph W. Domaracki

Interim Associate Dean for Teacher Education

Appendix A
Bachelor of Science in Education - Chemistry
Suggested Sequence

1 st Semester			2 nd Semester		
		cr			cr
CHEM 111 (Gen. Chem. I) or 113 (Adv. Gen. Chem. I)		4	CHEM 112 (Gen. Chem. II) or 114 (Adv. Gen. Chem. II)		4
BIOL 111	Principles of Biology I	4	MATH 125	Calculus I	3
ENGL 101	College Writing	3	HIST 196	Explorations in US History	3
COMM 103	Dig. Instruction Tech. (needed for elec. portfolio)	3	PSYC 101	General Psychology	3
			ENGL 121	Humanities Literature	3
	Fine Arts	3			
		17			16
<p><i>Begin to develop professional portfolio based on the requirements and expectations of the Chem. Ed. Program.</i> <i>Take PRAXIS I exams during 1st semester. The Writing section can not be taken until completion of ENGL 101.</i></p>			<p><i>Last chance to take and pass PRAXIS I exams (Writing, Math and Reading). PRAXIS I exams may be taken a maximum of 2 times before the student is ineligible for admission to the IUP Teacher Certification Program.</i></p>		
3 rd Semester			4 th Semester		
		cr			cr
CHEM 231	Organic Chemistry I	4	CHEM 232	Organic Chemistry II	4
PHYS 111	Physics I Lecture	3	PHYS 112	Physics II Lecture	3
PHYS 121	Physics I Lab	1	PHYS 122	Physics II Lab	1
EDSP 102	Educational Psychology	3	EDUC 242	Pre-student Teach. C.E. I	1
MATH 126	Calculus II	3	HPED 143	Health & Wellness	3
	Social Science Elective	3		Social Science Elective	3
		17			15
STEP 1. ADMISSION TO TEACHER CERTIFICATION PROGRAM					
<p><u>Procedure:</u> <i>During the 4th semester, the Chem. Ed. major must file: (1) an application for admission to teacher certification and (2) a professional goals essay with the major academic advisor.</i></p> <p><u>Requirements for Admission:</u></p> <ul style="list-style-type: none"> • Completion of at least 48 semester hours. • A minimum grade point average 3.0 • A grade of "C" or better in the following courses: COMM 103, EDSP 102, ENGL 101, ENGL 121. • A grade of "C" or better for 6 or more hours of college-level mathematics. • Completion of initial speech and hearing screening tests. • Clearance on TB test. • Clearance on ACT 34 (criminal record check, must be done annually, file in May of every year). • Clearance on ACT 151 (child abuse check, must be done annually, file in May of every year). • Attainment of satisfactory scores on the four components of the PRAXIS I exams (Writing, Math and Reading). • Program Department evaluation and approval of student's Professional Portfolio based upon established criteria. • Satisfactory completion of an essay describing personal goals and reason for wanting to become an educator. • An affirmative recommendation from the major department advisor. <p><i>If the requirements for "Admission to Teacher Certification" are not met by the end of the student's 4th semester or after completing 60 semester hours, the student will not be permitted to continue pursuit of professional education and will be counseled into another major or program of study.</i></p>					

5 th Semester			6 th Semester		
		cr			cr
CHEM 341	Physical Chemistry I	4	CHEM 214	Intermediate Inorganic	3
CHEM 343	Physical Chem I Lab	1		CHEM elective	3
CHEM 390	Chemistry Seminar II	1	EDUC 342	Pre-student Teach. C.E. II	1
GEOS 201	Foundations of Geology	4	EDUC 442	School Law	1
EDEX 301	Inclusion in Sec. Ed.	2	ENGL 202	Research Writing	3
EDSP 477	Assess. of Stu. Learning	3		Philos./Reg. Studies	3
		15			14

STEP 2. ADMISSION TO STUDENT TEACHING

Procedure:

During the 7th semester, the student must file an Application for Student Teaching through the department coordinator with the Office of the Associate Dean for Teacher Education.

Requirements:

- Completion of all requirements in Admission to Teacher Certification.
- Completion of all of the following required professional education core courses with a minimum grade of "C" in each: EDEX 301, COMM 103, EDSP 102, EDUC 242, EDUC 442, EDUC 342, EDSP 477 and EDUC 451.
- Satisfactory completion of at least 91 semester hours with a cumulative grade point average of 3.0, as required by Act 354. Transfer students with sufficient credits (91) must complete one semester (12 sh minimum) at IUP to establish a GPA.
- Completion of the liberal studies science requirement courses with a minimum grade of "C".
- Attainment of a passing score on the currently required PRAXIS II exams (and other PDE exams required for teaching chemistry, as set annually by the Pennsylvania Secretary of Education).
- An affirmative recommendation from the major department advisor or program coordinator.
- Program Department evaluation and approval of student's Professional Portfolio based upon the chemistry program's established criteria.
- Current clearance on ACT 34 (criminal record check) and Act 151 (child abuse).

7 th Semester			8 th Semester		
		cr			cr
Biochemistry (BIOC 301 or CHEM 351)		3-4			
CHEM 325	Analytical Chemistry I	4	EDUC 441	Student Teaching	12
CHEM 498	Problems in Chemistry	1			
EDUC 451	Teaching Sci. in Sec. Sch.	3			
EDEX 323	In. of E. L. L. w/Sp. Needs	2			
	Free Elective	0-1			
		14			12