

LSC Use Only Proposal No:
LSC Action-Date: APP-9/27/12

UWUCC Use Only Proposal No: 12-249
UWUCC Action-Date: APP-10/16/12 Senate Action Date: APP-11/6/12

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

| | |
|--|------------------------------------|
| Contact Person(s) Sharon Sowa | Email Address ssowa@iup.edu |
| Proposing Department/Unit Chemistry | Phone 74481 |

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: CHEM 390 Chemistry Seminar II
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: _____
Proposed program name, if changing: _____

| 5. Approvals | Signature | Date |
|--|-----------|----------|
| Department Curriculum Committee Chair(s) | | 4/11/12 |
| Department Chairperson(s) | | 4/11/12 |
| College Curriculum Committee Chair | | 4/20/12 |
| College Dean | | 4/20/12 |
| Director of Liberal Studies (as needed) | | 10/4/12 |
| Director of Honors College (as needed) | | |
| Provost (as needed) | | |
| Additional signature (with title) as appropriate | | |
| UWUCC Co-Chairs | | 10/16/12 |

Received

APR 20 2012

Liberal Studies

REQUEST FOR APPROVAL TO USE W-DESIGNATION

LSC # _____
Action _____

TYPE I. PROFESSOR COMMITMENT

- () Professor _____ Phone _____
- () Writing Workshop? (If not at IUP, where? when?) _____
- () Proposal for one W-course (see instructions below)
- () Agree to forward syllabi for subsequently offered W-courses?

TYPE II. DEPARTMENT COURSE

- (x) Department Contact Person S. Sowa Phone 74481
- (x) Course Number/Title CHEM 390 Chemistry Seminar II
- (x) Statement concerning departmental responsibility
- (x) Proposal for this W-course (see instructions below)

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III. TYPE III. SPECIFIC COURSE AND SPECIFIC PROFESSOR(S)

- () Professor _____ Phone _____
- () Course Number/Title _____
- () Proposal for this W-course (see instructions below)

SIGNATURES:

Professor(s)

Department _____
 Chairperson *Gene R. Long*
 College Dean _____

Director of Liberal Studies *J. H. Powell*

COMPONENTS OF A PROPOSAL FOR A WRITING-INTENSIVE COURSE:

- I. "Writing Summary"--one or two pages explaining how writing is used in the course. First, explain any distinctive characteristics of the content or students which would help the Liberal Studies Committee understand your summary. Second, list and explain the types of writing activities; be especially careful to explain (1) what each writing activity is intended to accomplish as well as the (2) amount of writing, (3) frequency and number of assignments, and (4) whether there are opportunities for revision. If the activity is to be graded, indicate (5) evaluation standards and (6) percentage contribution to the student's final grade.
- II. Copy of the course syllabus.
- III. Two or three samples of assignment sheets, instructions, or criteria concerning writing that are given to students. Limit: 4 pages. (Single copies of longer items, if essential to the proposal, may be submitted to be passed among LSC members and returned to you.)

Please number all pages. Provide one copy to Liberal Studies Committee.

Before you submit: Have you double-checked your proposal against "The Liberal Studies Committee's Most Frequently Asked Questions"?

I. Catalog Description

CHEM 390 Chemistry Seminar II 1 class hour, 1 credit (1c-0l-1cr)

Prerequisites: CHEM 290 or CHEM 232

Description: Seminar course intended to provide knowledge to students regarding effective oral and written scientific communication, and the ethics of scientific practice. Students will learn how to read and evaluate a research paper from the literature, how to formulate and write a research proposal, and how to present a research poster. Attendance of seminars outside of class time is required.

II. Course Outcomes

CHEM 390/490 serve together as one writing-intensive course. In the first semester, students will gain experience in reading and evaluating research reports from the literature, as they prepare a research proposal. The written proposal will be accompanied by a poster presentation, a common form of scientific communication. The process will involve written assignments as well as leading and participating in group discussions. Ethical considerations will be addressed in the form of case studies. Students will also attend and evaluate scientific seminars presented by various speakers. Through these exercises, students will gain an appreciation for the process of scientific discovery, and, most importantly, the methods to present, evaluate, and disseminate knowledge.

Students will be able to

1. understand and interpret formal scientific papers and scientific presentations
2. use common chemical databases to find chemical information based on subject and compound searches
3. develop a research proposal on an appropriate topic
4. present a formal research proposal, in two traditional formats: as a written report; and as a scientific poster (includes oral question and answer session with faculty).
5. understand and discuss the American Chemical Society (ACS) Chemist's Code of Conduct and the ACS Ethical Guideline to Publication of Chemical Research

III. Detailed Course Outline: note 1 hour = 1 academic hour or 50 minutes

| | | |
|----|--|---------|
| 1. | Introduction: How to Read a Research Paper | 1 hour |
| 2. | Writing Assignment 1: Writing a laboratory procedure from a classic journal article, e.g. Bradford Assay | 1 hour |
| 3. | Searching Chemical Abstracts Services Writing Assignment 2: Summary of Journal Paper 1 | 1 hour |
| 4. | Writing Assignment 3: Literature Search for Research Topic Class discussion of Paper 2 in 'Journal Club' format | 1 hour |
| 5. | Discussion/Presentations of Journal Readings from Individual Research Projects | 2 hours |

| | | |
|-----|--|---------|
| | Writing Assignment 4: Draft of Purpose & Objectives of Research Proposal Writing Assignment 5: Student C.V. and application to summer REU | |
| 6. | American Chemical Society (ACS) Chemist's Code of Conduct and the ACS Ethical Guideline to Publication of Chemical Research Writing Assignment 5: Draft of Introduction & Background Section of Research Proposal | 1 hour |
| 7. | Scientific Ethics: Class Discussion Writing Assignment 6: Case Studies in Scientific Ethics | 1 hour |
| 8. | Preparing the Research Poster Writing Assignment 7: Draft of Methodology and Budget Sections of Research Proposal | 1 hour |
| 9. | CHEM 498/499 Requirements Writing Assignment 8: Draft Outline of Research Poster | 1 hour |
| 10. | Working Sessions: Poster Preparation Writing Assignment 9: Draft of Research Poster | 3 hours |
| 11. | Class Discussion: "What makes an effective research presentation?" Writing Assignment 10: Final Research Proposal | 1 hour |
| 12. | Terminating Activity: Research Poster presentation during Final Exam period | 2 hours |

IV. Evaluation Methods

The final grade will be determined as follows:

40 %: Assignments involving information retrieval and analysis from chemical databases, analyzing journal articles, on writing a *curriculum vitae*/resumé, on ethics in chemical research and on developing a research proposal.

10 %: Seminar Attendance. Students are expected to attend weekly Chemistry Department seminars, which are given by external or IUP faculty or IUP graduate students, and write a brief report on 5 seminars.

30 %: Formal Written Research Proposal. The intent is that this research proposal will form the basis of a research project for CHEM 498.

20 %: Proposal Presentation. Students will give professional quality poster presentations of their research proposals during the scheduled final exam period. Students will be expected to defend and explain orally their proposals to faculty.

V. Example Grading Scale

Grading Scale: A: $\geq 90\%$ B: 80-89% C: 70-79% D: 60-69% F: $< 60\%$

VI. Attendance Policy

The attendance policy for this course will be consistent with the attendance policy in the current IUP undergraduate catalogue.

VII. Required Textbook(s), Supplemental Books and Readings

Students will receive some handouts, but will be required to use library and electronic means to retrieve information. There is no textbook for the course.

IX. Bibliography

1. American Chemical Society, *The Chemist's Code of Conduct*, Washington, DC (1994).
2. American Chemical Society *Undergraduate Professional Education in Chemistry: ACS Guidelines and Evaluation Procedures for Bachelor's Degree Programs*, Washington, DC (2008).
3. Dodd, J.S. (editor) *The ACS Style Guide: A Manual for Authors and Editors, Third Edition*, American Chemical Society: Washington, DC, (2006)
4. Doyle, Michael P. editor, *Academic Excellence*, Research Corporation, Tuscon, AZ (2000).
5. Gornick, Vivian, *Women in Science: Then and Now*, The Feminist Press at CUNY, New York (2009).
6. <http://agricola.nal.usda.gov/> (an agricultural literature online database)
7. Laursen, Sandra, Barrie-Hunter, Anne, Seymour, Elaine, Thiry, Heather, and Melton, Ginger, *Undergraduate Research in the Sciences: Engaging Students in Real Science*, Wiley, San Francisco (2010).
8. McCray, Richard A., DeHaan, Robert L., Schuck, Julie, (Editors), *Improving Undergraduate Instruction in Science, Technology, Engineering, and Mathematics: Report of a Workshop*, National Academies Press, Washington, DC (2003).
9. Sigma Xi, The Scientific Research Society, *The Responsible Researcher: Paths and Pitfalls*, Research Triangle Park, NC (1999).
10. www.cas.org (online chemical abstracts service)
11. www.ncbi.nlm.nih.gov/pubmed/ (an online medical literature database)

VIII. SPECIAL RESOURCE REQUIREMENTS

Students are expected to be proficient in retrieving scientific information from the literature, and should have access to a computer to use web sites that provide supplementary information. Students should also be familiar with PowerPoint for their Journal Club presentations.

Course Analysis Questionnaire

Section A: Details of the Course

A1 How does this course fit into the programs of the department? For what students is the course designed? (majors, students in other majors, liberal studies). Explain why this content cannot be incorporated into an existing course.

CHEM 390 is designed to teach chemistry majors to develop methods to obtain current scientific information, to evaluate it, and to develop an idea into a formal research proposal that is presented in both written and oral (poster) format.

A2 Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

This course proposal is designed to replace CHEM 301 Introduction to Chemical Research. The combination of CHEM 390/490 will serve as a writing intensive component in three tracks of the revised Chemistry B.S. degree program. The two courses together will cover all aspects of effective scientific communication: the research proposal, the research poster, a formal paper (on a particular topic of interest that may or may not include the student's research project) and a formal seminar. The three seminar courses CHEM290/390/490, along with their individual independent study (CHEM 498) are designed to thoroughly prepare chemistry students for a successful career path following completion of their degree. The revisions of these programs are included in this package.

A3 Has this course ever been offered at IUP on a trial basis (e.g. as a special topic) If so, explain the details of the offering (semester/year and number of students).

No

A4 Is this course to be a dual-level course? If so, please note that the graduate approval occurs after the undergraduate.

No

A5 If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student? Who will make this determination and by what procedures?

No variable credit

A6 Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

West Chester University: CHEM 418 Chemical Info, CHEM 480 Intro to Chemical Research, CHEM 491 Chemistry Seminar, Mansfield University: CHEM 4410 Chemistry Seminar, Bloomsburg University: CHEM 52281 Intro to Scientific Literature, Slippery Rock University: CHEM 491 Chemistry Seminar

A7 Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation.

No

Section B: Interdisciplinary Implications

B1 Will this course be taught by instructors from more than one department? If so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

There will be only one instructor for this course, although many faculty members will serve as research advisors and may wish to make voluntary contributions to the student research proposals.

B2 What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

CHEM 390 will have no effect on the curriculum of other departments.

B3 Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

The concept of this course is to facilitate undergraduate research in chemistry, biochemistry and related departments across campus.

Section C: Implementation

C1 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. What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

This course proposal is part of a Chemistry Department program revision. The sum of all the changes included in this revision will be a reduction of 9-10 workload hours, and three preps, for the department's faculty.

C2 What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following:

All resources needed to offer this course are already in place.

C3 Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)

No

C4 How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

CHEM 390 is envisioned to be offered every fall semester.

C5 How many sections of this course do you anticipate offering in any single semester?

One

C6 How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?

Based on enrolment trends, ~30 students are expected in this course.

C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

No

C8 If this course is a distance education course, see the Implementation of Distance Education Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.

Not a distance education course.

Section D: Miscellaneous

Include any additional information valuable to those reviewing this new course proposal.

Sample Assignment 1:

Writing a step-by-step laboratory procedure from a published reference. (25 points)

The skill to go from written word to experimental procedure is required for successful laboratory research.

Reference: [Bradford, M.M.](#) (1976), "Rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding", *Anal. Biochem.* **72**: 248-254. (attached)

This is a 'methods' paper and we will treat it as instructions on how to do a protein assay (which it actually is). Note that published methods also appear in the hard-cover 'Methods in Enzymology' a classic biochemistry reference updated regularly - currently there are at least 480 volumes in the series - as well as other books and journals.

Use this reference to write out a **detailed procedure** for measuring the concentration of an unknown protein solution you are working with in the lab.

- Start with your reagents: what do you need, where are you going to get them? Make a list to include catalog numbers, quantity, and price.
- What solutions do you need to prepare in order to complete the assay?
Write out the exact quantities needed to make each solution.
Write out the exact instructions for making the solutions.

- What equipment is needed? Assume that you have the same instrument listed in the reference, along with cuvettes (you do NOT have a diode array computer-interfaced spectrophotometer)
- How will you analyze your data? Be specific on how you will treat the numbers (again, no computer)

Your writing assignment should be a complete recipe/instruction for the Bradford assay (as it was done in 1976). Note that if you were doing this in 1976, you would not be able to look up the reagents online, but would have to physically find a catalog and page through it to find what you needed (yikes!). And how in the world will you figure the standards without 'excel'?

Based on your reading of the reference, what cautions should you make when analyzing your data and results?

A more common assay (that you probably used in lab) is the BCA assay that comes in a convenient kit. What analytical advantage(s) does BCA have over Bradford?

Now pause and reflect on the current day kits available to do all types of laboratory procedures, and the fact that 1976 is a mere 35 years ago. How will things change 40 years from now (well within your life experience)?!

Grading Rubric: Points are awarded for clarity, conciseness and correctness.

- ___ List of reagents/sources is supplied (0-3 points)
- ___ Procedure is easy to follow and is written step-by-step (0 - 10 points)
- ___ Methods of data analysis are clearly explained (0-5 points)
- ___ BCA assay is compared (0-2 points)
- ___ Reflection regarding progress in science is included, and all writing uses correct grammar, spelling and punctuation (0-5 points)

Sample Assignment 2: Writing a Report Based on Seminar Attendance (10 points)

Outline for seminar report: Use the following outline/questions to guide you in preparing your report on each seminar. A total of five separate reports is required.

Include:

- Seminar Title
- Seminar date/location
- Seminar speaker(s)

Scientific Content:

What was the main subject of the seminar?

(this might be summer research experiences of several students)

Did you understand the experiment(s)?

- Did you recognize the technique?
- Did the data make sense?
- Did the data reflect the conclusions?

What questions do you have regarding this subject?

Presentation Style (constructive criticism):

What is your opinion of the presentation?

- Did the speaker appear knowledgeable and relaxed?
- Were the visual aids clear and helpful?
- Was the talk well organized?
- Was the seminar at a level that you could understand it?
- Did the speaker field questions well?
- Would you suggest any improvements?

Grading Rubric: Points are awarded for clarity, conciseness and correctness.

- ___ Seminar is clearly represented (Date/location/speaker/subject) (0-2 points)
- ___ Methods of data analysis are clearly explained (0 - 2 points)
- ___ Conclusions made by the speaker are compared to the data presented(0-2 points)
- ___ Constructive criticism of the speaker is made (0-2 points)
- ___ All writing uses correct grammar, spelling and punctuation (0-2 points)

Chemistry Department Statement of Responsibility for All Writing-Intensive Courses:

The Department Chair shall provide a copy of this agreement to each faculty member assigned to teach a Writing-Intensive course.

Each faculty member assigned to teaching a Program Writing Intensive Course agrees to the following criteria:

- Writing assignments are an integral part of the course, which promise to enhance student learning (not 'exercises in writing for writing's sake').
- Writing assignments will include various forms of writing such as case studies, laboratory reports, journals, letters, memos, formal essays, research articles, project or grant proposals, etc.
- The improvement of student writing is a clear objective of the course.
- Students will be provided with written instructions that cover major criteria for the evaluation of the assignment(s).
- Students will receive guidance in conceiving, organizing, and presenting written material in ways appropriate to the field of Chemistry/Biochemistry.
- Students will produce at least 5000 words (15-20 typed pages) of writing that will be critically evaluated.
- Each writing assignment will have specified length in terms of minimum number of pages required.
- Writing assignments include at least one major assignment and several shorter different assignments.
- Students will be required to submit drafts of at least one major writing assignment that will be returned with instructor comments/suggestions for improvement before the final copy of the assignment is due, so that students have an opportunity to revise their written work.
- Students will submit final copies of writing assignments for critical evaluation.
- Instructor evaluation of written work will comprise at least 50% of the course grade.

Summary Chart for Writing Assignments*

| A. Writing Assignments | | | | | |
|--|------------------|------------------|-----------------|-----------------------------------|--|
| Assignment Title | # of Assignments | # of total pages | Graded (Yes/No) | Opportunity for Revision (Yes/No) | Written Assignment represents what % of final course grade |
| Information retrieval | 4 | 10-20 | yes | yes | 30% |
| Scientific Ethics | 1 | 4-5 | yes | no | 10% |
| Seminar Attendance | 5 | 5-10 | yes | no | 10% |
| Research Proposal Poster Presentation | 6 | 10-20 | yes | yes | 30% |
| Totals | 16 | 29-55 | NA | NA | 80 % |

| B. Examinations (Complete only if you intend to use essay exams/short answers as part of the required number of pages of writing.) | | | |
|---|--|---|---|
| Exams | Approx.% of exam that is essay or short answer | Anticipated # of pages for essay or short answer, or approx. word count | Exam constitutes what % of final course grade |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| Totals | | | |

**Total writing assignments should contain at least 5000 words (approximately 15-20 typed pages) in two or more separate assignments; written assignments should be a major part of the final grade—at least 50% or more.*

CHECK LIST FOR WRITING-INTENSIVE PROPOSALS

The Liberal Studies Committee's Most Frequently Asked Questions,
Based on the Senate Criteria for Writing-Intensive Courses

For All Writing-Intensive Courses:

- Are the writing assignments integral parts of the course, rather than exercises that seem tacked on artificially? Are they assignments that promise to enhance student learning?
- Have you considered various forms of writing such as case studies, laboratory reports, journals, letters, memos, formal essays, research articles, project or grant proposals, and so forth?
- Does one of your course objectives explicitly mention the improvement of writing?
- Will you distribute written instructions, including criteria for evaluation, for major assignments?
- Will students receive guidance in conceiving, organizing, and presenting written material in ways appropriate to the subject being studied?
- Will students produce at least 5000 words (15-20 typed pages) of writing that you evaluate? Have you clarified this by giving us the minimum number of pages that you expect for each writing assignment?
- Are there at least two, and preferably more, different writing assignments?
- Will students revise at least one assignment after receiving your review comments?
- Does at least one assignment require students to produce finished, edited prose (as differentiated from whatever informal or draft writing you have included)?
- Are written assignments (in-class; out-of-class) worth at least 50% of the course grade?

For Type I (Professor Commitment) Writing-Intensive Courses:

- Have you attended a writing workshop either at IUP or elsewhere? [If not, have you indicated at least equivalent preparation based on such things as graduate education, teaching experience in writing courses, publications, conference attendance, or other professional activities?]

For Type II (Departmental) Writing-Intensive Courses:

- Does your "statement of departmental responsibility" explain how the department will ensure that the writing component is present regardless of who is teaching? Does it identify the specific department group or individual who is responsible for ensuring this?