CGS Agenda Item:	09-10
Proposal Effective Date:	Spring 2010

Eastern Illinois University

NEW COURSE PROPOSAL

Please check one: ☒ New course ☐ Revised course

PART I: CATALOG DESCRIPTION

1. **Course prefix and number, such as ART 1000:** CHM 5180
2. **Title (may not exceed 30 characters, including spaces):** Bioanalytical Problem Solving
3. **Long title, if any (may not exceed 100 characters, including spaces):** Bioanalytical Problem Solving
4. **Class hours per week, lab hours per week, and credit [e.g., (3-0-3)]:** (2-3-3)
5. **Term(s) to be offered:** ☐ Fall ☒ Spring ☐ Summer ☐ On demand Even numbered years
6. **Initial term of offering:** ☐ Fall ☒ Spring ☐ Summer **Year:** 2010
7. **Course description (not to exceed four lines):** Theoretical bases and practical applications of experimental design and bioanalytical chemistry. Laboratory experiences utilize a team approach to address modern bioanalytical practices and real-world problems.
8. **Registration restrictions:**
   - a. **Identify any equivalent courses** (e.g., cross-listed course, non-honors version of an honors course). None
   - b. **Prerequisite(s), including required test scores, courses, grades in courses, and technical skills. Indicate whether any prerequisite course(s) MAY be taken concurrently with the proposed/revised course.** Prerequisites: (CHM 3780 or equivalent; CHM 3300 or 3450 or equivalent) or permission of the department chair
   - c. **Who can waive the prerequisite(s)?**

     ☐ No one ☒ Chair ☐ Instructor ☐ Advisor ☐ Other (Please specify)

   - d. **Co-requisites** (course(s) which MUST be taken concurrently with this one): None
   - e. **Repeat status:** ☒ Course may not be repeated.

     ☐ Course may be repeated to a maximum of hours or times.

   - f. **Degree, college, major(s), level, or class to which registration in the course is restricted, if any:** graduate standing
   - g. **Degree, college, major(s), level, or class** to be excluded from the course, if any:

     None
9. **Special course attributes** [cultural diversity, general education (indicate component), honors, remedial, writing centered or writing intensive] None

10. Grading methods (check all that apply): ☒ Standard letter ☐ C/NC ☐ Audit ☐ ABC/NC ("Standard letter"—i.e., ABCDF--is assumed to be the default grading method unless the course description indicates otherwise.)

11. Instructional delivery method: ☐ lecture ☐ lab ☒ lecture/lab combined ☐ independent study/research ☐ internship ☐ performance ☐ practicum or clinical ☐ study abroad ☐ other

PART II: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

As a result of this course students will demonstrate:

1. Advanced understanding of chemical analytical experimental design and quality control principles.
2. Advanced understanding of chemical separations, molecular spectroscopy, mass spectrometry and electrochemistry, including modern techniques and instrumentation.
3. Successful application of principles of advanced analytical chemistry and biochemistry in solving inquiry-based problems in chemistry, biochemistry, and medical science.
4. Critical analysis and incorporation of modern primary chemistry and biochemistry literature sources in development and support of solving analytical problems.
5. Effective participation in a team problem-solving environment (mimicking a common private sector scenario).
6. Effective oral and visual communication of analytical problem-solving issues to project group members, class peers, and course instructors
7. Effective use of writing to communicate approaches to analytical problem-solving.

a. This is not a general education course,

b. If this is a graduate-level course, indicate which objectives are designed to help students achieve established goals for learning at the graduate level:

- Depth of content knowledge—Objectives 1-4
- Effective critical thinking and problem solving –Objectives 1-7
- Effective oral and written communication—Objectives 1,2,5,6,7
- Advanced scholarship through research or creative activity—Objectives 3,4,6,7

2. Identify the assignments/activities the instructor will use to determine how well students attained the learning objectives:

Student Learning Objective ↓	In class Exams (30%)	Final Exam (15 %)	Written reports (45%)	Oral Presentation (10%)
1	x	x	x	x
2	x	x		
3			x	x
4			x	x
5			x	x
6				x

7	x	x	x	

3. Explain how the instructor will determine students' grades for the course: Course grades will be determined through two in-class exams (30%), a final exam (15%), written reports of the bioanalytical laboratory problems addressed (45%), and an individual 20 minute oral presentation on an aspect of one of the bioanalytical laboratory problems addressed (10%).

4. Not a technology-delivered course.-:

5. Not a course numbered 4750-4999-:

6. Not a writing-active, writing-intensive, or writing-centered, course

PART III: OUTLINE OF THE COURSE

Week	Course Format	Topic(s)
1	Three 50 minute lectures	Chemical measurement statistics and statistical analysis
2	Three 50 minute lectures	Experimental Design in Analytical Measurement
3	Three 50 minute Lectures	Experimental Design and Quality Control
4-6	Two 50 Minute Lectures; one three hour lab per week	Exam I Chromatographic separations **Topics:** Chemical separations, characteristics and bonding interactions of biomolecules, structural and chemical properties of chromatographic matrices, biomolecule and matrix interactions, instrumentation. **Assignments:** Team solving of inquiry-based laboratory problems in separation of biomolecules. Individual report I based on this assignment.
7-9	Two 50 Minute Lectures; one three hour lab per week	Spectroscopy and Fluorescence **Topics:** Spectroscopic techniques, fluorescence spectroscopy, biofluorophore chemistry, instrumentation and applications (Tags, RT-PCR, molecular imaging, genomics, proteomics, FRET). **Assignments:** Team solving of inquiry-based laboratory problems in bioanalytical fluorescence; site visit (U of I). Individual report II based on this assignment.
10-12	Two 50 Minute Lectures; one three hour lab per week	Exam II Electrochemistry **Topics:** Basics of electrochemistry, redox couples, electron

		transfer proteins, free radical chemistry, electrobioanalytical chemistry, instrumentation and applications. **Assignments:** Team solving of inquiry-based laboratory problems in electrobioanalytical chemistry. Individual report III based on this assignment.
13	Two 50 Minute Lectures; one three hour lab per week	Bioanalytical Applications of Mass spectrometry (site visit)
14-15	Three 50 Minute Class Periods	Student presentations

PART IV: PURPOSE AND NEED

1. **Explain the department's rationale for developing and proposing the course.**
   This course is part of our revised graduate program that focuses on advanced knowledge of the subdisciplines of chemistry (for this course analytical chemistry and biochemistry) as well as incorporation of modern team approaches to problem solving. It is well suited for graduate students planning to pursue a Ph.D. or, in particular, those students seeking an advanced position in the private sector.

   a. **This is not a general education course.**
   b. **This course is not technology delivered.**

2. **Justify the level of the course and any course prerequisites, co-requisites, or registration restrictions.**
   This is a graduate level course in chemistry, so the expectation is that students enrolling in this course have completed undergraduate coursework equivalent to EIU's CHM 3780 (Instrumental Analysis) and CHM 3300 (Survey of Biochemistry) (or 3450 (Biochemistry I)).

3. **If the course is similar to an existing course or courses, justify its development and offering.**

   a. **If the contents substantially duplicate those of an existing course, the new proposal should be discussed with the appropriate chairpersons, deans, or curriculum committees and their responses noted in the proposal.**
   b. **Cite course(s) to be deleted if the new course is approved. If no deletions are planned, note the exceptional need to be met or the curricular gap to be filled.**

   CHM 5100 (Advanced Analytical Chemistry) will be deleted if this new course is approved.

4. **Impact on Program(s):**

   a. **For undergraduate programs, specify whether this course will be required for a major or minor or used as an approved elective.** NA

b. **For graduate programs, specify whether this course will be a core requirement for all candidates in a degree or certificate program or an approved elective.** This course will serve as a core requirement for all MS in Chemistry students.

PART V: IMPLEMENTATION

1. **Faculty member(s) to whom the course may be assigned:** This course will be team taught. Faculty members to whom it might be assigned are Klarup, Mitrovski, Blitz, and Periyannan

2. **Additional costs to students:** none

   Include those for supplemental packets, hardware/software, or any other additional instructional, technical, or technological requirements. (Course fees must be approved by the President's Council.)

3. **Text and supplementary materials to be used (Include publication dates):** (1) Bioanalytical Chemistry by Manz, Pamme, and Iossifidis (2004); (2) Applied Chemometrics for Scientists by Brereton (2007); (3) Principles of Instrumental Analysis, 6th Edition, by Skoog, Holler, and Crouch (2007).

PART VI: COMMUNITY COLLEGE TRANSFER

If the proposed course is a 1000- or 2000-level course, state either, "A community college course may be judged equivalent to this course" OR "A community college course will not be judged equivalent to this course." A community college course will not be judged equivalent to a 3000- or 4000-level course but may be accepted as a substitute; however, upper-division credit will not be awarded. N/A

PART VII: APPROVALS

Date approved by the department or school: April 2, 2009

Date approved by the college curriculum committee:

Date approved by CGS:

*In **writing-active courses**, frequent, brief writing activities and assignments are required. Such activities -- some of which are to be graded – might include five-minute in-class writing assignments, journal keeping, lab reports, essay examinations, short papers, longer papers, or a variety of other writing-to-learn activities of the instructor's invention. Writing assignments and activities in writing-active courses are designed primarily to assist students in mastering course content, secondarily to strengthen students' writing skills. In **writing-intensive courses**, several writing assignments and writing activities are required. These assignments and activities, which are to be spread over the course of the semester, serve the dual purpose of strengthening writing skills and deepening understanding of course content. At least one writing assignment is to be revised by the student after it has been read and commented on by the instructor. In writing-intensive courses, students' writing should constitute no less than 35% of the final course grade. In **writing-centered courses** (English 1001G, English 1002G, and their honors equivalents), students learn the principles and the process of writing in all of its stages, from inception to completion. The quality of students' writing is the principal determinant of the course grade. The minimum writing requirement is 20 pages (5,000 words).