08-12

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:
	App-4/10/08	Senate Action Date: App 11/4/08 U	App-10/21/08

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person: **John Woolcock**	Email Address: **woolcock@iup.edu**
Proposing Department/Unit: **Chemistry**	Phone: **7-4828**

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

1. Course Proposals (check all that apply)

__X__ New Course _____ Course Prefix Change _____ Course Deletion

____ Course Revision ___ Course Number and/or Title Change _____ Catalog Description Change

	CHEM 105 – The Forensic Chemistry of CSI
***Current* Course prefix, number and full title**	***Proposed* course prefix, number and full title, if changing**

2. Additional Course Designations: check if appropriate

__X__ This course is also proposed as a Liberal Studies Course. _____ Other: (e.g., Women's Studies, Pan-African)

_____ This course is also proposed as an Honors College Course

3. Program Proposals

_____ Catalog Description Change ____ Program Revision

_____ New Degree Program _____ Program Title Change _____ Other

_____ New Minor Program _____ New Track

***Current* program name**	***Proposed* program name, if changing**

4. Approvals		**Date**
Dept Curriculum Committee Chair	Wendy Ron Elcesse	12/6/07
Department Chair	John Woolcock	12/6/07
Coll. Curriculum Committee Chair		04/04/08
College Dean	Gary A Stoughton	4-4-08
Director of Liberal Studies *	Mary E Saleen	4-17-08
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)		
UWUCC Co-Chairs	Gail S Sechrist	10/21/08

* where applicable

Received
OCT 20 2008
Liberal Studies

Received
APR 04 2008
Liberal Studies

Course Syllabus

I. Catalog Description

CHEM 105 The Forensic Chemistry of *CSI* **3c-0l-3cr**

Designed for students who would like to learn about forensic chemistry and the basic science needed to understand it. Chemical concepts, on the level of an introductory chemistry course and their applications to forensic science will be explored in detail. Topics will include the forensic analysis of drugs, fibers, glass, fingerprints, arson, questioned documents and other types of physical evidence. Other topics will include how forensic science is portrayed in novels, movies, computer games and TV and the methods used in forensic evidence collection at a crime scene. This course cannot be used to fulfill the requirements for a CHEM major or minor.

II. Objectives: Upon successful completion of this course, the student will:

1. Describe chemical concepts, apply chemical rules and solve chemical problems related to the characteristics of matter, the periodic table, scientific measurements, basic atomic theory and electron structure, ionic and covalent compounds, basic reactions, solutions, structure of covalent compounds and organic chemistry.
2. Apply the basic concepts of chemistry to understand topics in forensic science including: examining a crime scene and collecting evidence, forensic analysis of drugs, fibers, glass, fingerprints, arson and other types of evidence.
3. Describe how forensic science is portrayed in fiction, compare that to the forensic science presented in the text and analyze how this is related to the CSI effect.

III. Detailed Course Outline: (Currently class meetings for this course are scheduled for two 75 minute sessions per week. Therefore 14 weeks x 2 meetings per week x 75 minutes/meeting = 35 hours)

1. Introduction to Forensic Science and Investigating *CSI* (1.25 hours)
   a. Forensic Science: fact and fiction
   b. The *CSI* Effect

2. Investigating the Crime Scene (2.5 hours)
   a. Securing & documenting the crime scene
   b. Collection, preservation, inventory and transportation of evidence
   c. Chain of custody and legal dimensions of evidence

3.Investigating and Processing Physical Evidence (2.5 hours)
   a. The modern crime lab and functions of a forensic scientist
   b. Characteristics of physical evidence
   c. Crime scene reconstruction

4. Physical Properties: Forensic Characterization of Soil (2.5 hours)
   a. Physical and chemical properties of substances
   b. The metric system, measurements and conversion factors
   c. Accuracy, precision and significant figures
   d. Forensic characteristics of soil

5. The Microscope and Forensic Identification of Hair and Fibers (1.25hours)
   a. Types of microscopes
   b. Forensic applications of microscopy: hair
   c. Forensic applications of microscopy: fibers

6.**Exam #1 (1.25 hours)**

7. **Forensic Analysis of Glass (2.5 hours)**
    a. Types of glass
    b. Physical and optical properties of glass
    c. Glass fractures

8. **Inorganic Analysis: Forensic Determination of Metals and Gunshot Residue (2.5 hours)**
    a. Atomic Theory and Structure
    b. Electron Structure and Orbitals
    c. Electron Configurations
    d. Atomic Spectroscopy and forensic determination of metals
    e. Gunpowder residues

9.**Chemical Evidence, Drug Chemistry and Chemistry of Addiction (5 hours)**
    a. Names and formulas of ionic and covalent compounds
    b. Lewis structures of covalent compounds, VSEPR, polar bonds
    c. Introduction to organic chemistry and functional groups

10. **Exam #2 (1.25 hours)**

11. **Arson (2.5 hours)**
    a. The chemistry of fire, combustion and factors that influence its intensity
    b. Hydrocarbon accelerants
    c. Determining the origin and cause of a fire
    d. Indicators of arson and collection of evidence
    e. Analysis of flammable residue

12. **Drugs of Abuse (2.5 hours)**
    a. History of drug regulation and drug dependence
    b. Narcotics, hallucinogens, depressants, stimulants, inhalants, club drugs and steroids
    c. Identification of drugs using presumptive and confirmatory tests
    d. Poisons

13. **Fingerprints (2.5 hours)**
    a. Characteristics of fingerprints
    b. Chemical methods for developing fingerprints
    c. Classification of fingerprint patterns

14. **Questioned Documents (1.25 hours)**
    a. Handwriting
    b. Physical and chemical erasures, obliterations and alterations
    c. Chemical analysis of ink and paper
    d. Security printing and identity documents

15. **Firearms (1.25 hours)**
    a. Physical characteristics of bullets
    b. Types of firearms
    c. Chemical composition of ammunition
    d. Collection, and examination of firearm evidence

16. **Exam #3 (1.25 hours)**

17. **Investigating *CSI* (1.25 hours)**
    a. Forensic Science: fact and fiction

b. The *CSI* Effect
c. Discussion of fiction report

Although this course does not have a laboratory, students will be given the opportunity to do some "hands-on" experiments, either in the classroom or as homework. There will be three exams of 75 minutes each, which will require 3.25 hours of class time.

IV. Evaluation Methods:

Exams	300 points
Assigned homework exercises	100 points
Report on a fiction book, video or computer game	40 points
In-class activities (worksheets, demonstrations, etc.)	50 points
Class participation	10 points

The exams will consist of a section of multiple choice, short-answer questions and word problem/short essay questions. The exercises and in-class activities will parallel the types of questions used on exams. The fiction report will focus on linking specific aspects of the forensic science to fictional portrayals of forensic science in books, TV movies or computer games. Examples possible sources for the fiction report are given in the bibliography. The final exam period will include a comprehensive exam covering all topics presented during the semester.

V. Example Grading Scale:

The MAXIMUM percentages that will be used to determine the final grade are:

100-90%	A
89-80%	B
79-70%	C
69-60%	D
59% or lower	F

VI. Attendance Policy:

The attendance policy for this course will be consistent with the Undergraduate Course Attendance Policy in the IUP Catalog.

VII. Required & Supplementary Textbook(s):

1. **Required Text:** *Criminalistics: Forensic Science and Crime*, James E. Girard, Jones & Bartlett, Sudbury, MA (2008). This is a chemistry oriented non-science majors textbook that covers a wide variety of forensic science topics.

2. **Supplementary Text:** *Investigating Chemistry: A Forensic Science Perspective*, Matthew Johll, W. H. Freeman, New York (2006). This text is used to provide additional material on chemistry topics such as classification of matter, atomic structure, scientific measurements, chemical compounds and organic chemistry.

3. **Supplementary Non-textbook Reading:** *Investigating CSI: An Unauthorized Look Inside the Crime Labs of Las Vegas, Miami and New York*, Donn Cortez, Editor, BenBella Books, Dallas, TX (2006). This book contains a variety of essays about the characters and production of the *CSI* TV series, the differences between TV and real life crime scene investigation, the impact of *CSI* series on popular culture and synopses of *CSI* episodes. This book was selected to support the forensic fiction report.

VIII. Special Resource Requirements:

None

IX. Bibliography:

Sources similar to the required and supplementary texts

1. *Criminalisitics: An Introduction to Forensic Science,* R. Saferstein, 9th ed., Prentice-Hall, Upper Saddle River (2007)
2. *Forensic Science*, Andrew R. W. Jackson and Julie M Jackson, Pearson-Prentice Hall, Harlow, England (2004)
3. *Introduction to Forensic Science & Criminalisitics*, R. E. Gaensslen, Howard A Harris and Henry Lee, McGraw-Hill, New York (2008)
4. *Forensic Science: The Basics*, Jay A. Siegel, CRC Press, Boca Raton, FL (2006)
5. *General, Organic and Biochemistry,* Ira Blei and George Odian, 2nd Edition. W. H. Freeman: New York (2006)
6. *Chemistry and Crime: From Sherlock Holmes to Today's Courtroom*, Samuel M Gerber, Ed., American Chemical Society, Washington, D. C. (1983)
7. *More Chemistry and Crime: From Marsh Test to DNA Profile*, Samuel M Gerber and Richard Saferstein, Eds. American Chemical Society, Washington, D. C. (1997)
8. *The CSI Effect*, by Katherine Ramsland, Berkeley Boulevard Books, New York (2006)

Examples of sources for the forensic fiction report

9. *CSI: Crime Scene Investigations*, The First Seven Seasons (2000-2007)
10. *CSI: Miami*, The First Five Seasons (2002-2007)
11. *CSI: NY*, The First Three Seasons (2003-2007)
12. *Quincy, M. E.,* The Complete Series (1976-1983)
13. *Bones*, Season 1 and 2 (2005-2006)
14. *Sherlock Holmes: The Complete Novels and Stories*, by Sir Arthur Conan Doyle, Bantam Classics (1986)
15. *Body of Evidence* by Patricia Cornwell, Pocket Books (2004)

16. *The Bone Collector* by Jeffrey Deaver, Coronet Books (1997)

17. *Deja Dead* by Kathy Reichs. Pocket Star Books (1998)

18. *CSI: 3 Dimensions of Murder and CSI 4: Hard Evidence*, Ubisoft (2006-2007)

19. *The CSI: NY Virtual Experience in Second Life*, http://alpha.cbs.com/primetime/csi_ny/second_life

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.

This course is intended for students in any major who are interested in Chemistry as it applies to forensic science. While the chemistry concepts in this course are taught in other introductory chemistry courses, their specific application to forensic science is unique. There is no other Liberal Studies non-laboratory chemistry course in the Chemistry department. This course cannot be used to meet the requirements of a CHEM major or minor.

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.

No. This course does not significantly overlap any existing courses or requirements for a degree program.

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).

This course was offered as CHEM 281 in Spring 2006 by Ruiess Ramsey, who has since retired, and by John Woolcock in Spring 2007 and 2008. Over the past three years the enrollment has increased from 14 (2006) to 20 (2007) to 43 (2008). Also, during the semesters that CHEM 281 was offered we obtained Liberal Studies approval for this course to count as a non-laboratory science course under Natural Science Option 2.

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

No, this is not a dual-level course.

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?

This course has no variable credit.

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

Yes.

1. **Ursinis College, Chemistry 102, Dr. Tortorelli, *Introduction to Forensic Chemistry***
2. **Westminister College, Sci 150, Helen Boylan, *Introduction to Forensic Science***

3. **Bloomsburg University of PA, CHEM 52.105, Michael Pugh, *Introduction to Forensic Science***

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, the content of this course is not required by any external agency, professional society or accrediting authority.

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.

No, this course will have only one instructor.

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).

There is no significant overlap with courses from any other department.

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.

No, this course will not be cross-listed.

B4 Will seats in this course be made available to students in the School of Continuing Education?

Yes, seats can be made available as needed.

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.

The Provost has been providing 3 workload hours of temporary faculty complement to compensate the Chemistry Department for teaching this course as CHEM 281. This support must continue in order for the course to be continued to be offered as CHEM 105.

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:

The primary resource that is needed for this course are DVD box sets of the *CSI* TV shows and the books included in the bibliography and will requested from the IUP Library.

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, this course has not been grant funded.

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

This course will be initially offered once a year in the spring semester.

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

Only one section will be offered, unless student demand indicates otherwise.

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?

The enrollment will depend on the availability of large lecture rooms in Weyandt Hall.

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, this course has no recommended enrollment limit or other parameters.

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.

This will not be offered as a distance education course.

LIBERAL STUDIES COURSE APPROVAL, PARTS 1-3: GENERAL INFORMATION CHECK-LIST

I. Please indicate the LS category(ies) for which you are applying:

LEARNING SKILLS:

_____ First Composition Course
_____ Second Composition Course
_____ Mathematics

KNOWLEDGE AREAS:

_____ Humanities: History
_____ Humanities: Philos/Rel Studies
_____ Humanities: Literature
_____ Natural Sci: Laboratory
__X__ Natural Sci: Non-laboratory
_____ Fine Arts
_____ Social Sciences
_____ Non-Western Cultures
_____ Health & Wellness
_____ Liberal Studies Elective

II. Please use check marks to indicate which LS goals are primary, secondary, incidental, or not applicable. When you meet with the LSC to discuss the course, you may be asked to explain how these will be achieved.

Prim	Sec	Incid	N/A	
X				**A. Intellectual Skills and Modes of Thinking:** 1. Inquiry, abstract logical thinking, critical analysis, synthesis, decision making, and other aspects of the critical process.
X				2. Literacy--writing, reading, speaking, listening.
X				3. Understanding numerical data.
		X		4. Historical consciousness.
X				5. Scientific Inquiry.
X				6. Values (Ethical mode of thinking or application of ethical perception).
		X		7. Aesthetic mode of thinking.
	X			**B. Acquiring a Body of Knowledge or Understanding Essential to an Educated Person**
X				**C. Understanding the Physical Nature of Human Beings**
				D. Collateral Skills:
	X			1. Use of the library.
		X		2. Use of computing technology.

III. The LS criteria indicate six ways that courses should contribute to students' abilities. Please check all that apply. When you meet with the LSC, you may be asked to explain your check marks.

__X__ 1. Confront the major ethical issues which pertain to the subject matter; realize that although "suspended judgment" is a necessity of intellectual inquiry, one cannot live forever in suspension; and make ethical choices and take responsibility for them.

__X__ 2. Define and analyze problems, frame questions, evaluate available solutions and make choices.

__X__ 3. Communicate knowledge and exchange ideas by various forms of expression, in most cases writing and speaking.

____ 4. Recognize creativity and engage in creative thinking.

____ 5. Continue learning even after the completion of their formal education.

__X__ 6. Recognize relationships between what is being studied and current issues, thoughts, institutions, and/or events.

LIBERAL STUDIES COURSE APPROVAL, PARTS 4-6:

IV. **On a separate sheet of paper, please answer these questions.** (Do not include this sheet or copies of the questions in your proposal; submit only the answers.)

A. This is not a multi-section, multi-instructor course.

B. The incorporation of women and minorities in the course will largely be through the forensic case studies used throughout the course. In the text *Criminalisitics: Forensic Science and Crime*, the following case studies in the sections entitled *On the Crime Scene*, focus on minorities and women as perpetrators or victims of crime: Jon Benet Ramsey (Chapter 1), O.J. Simpson (Chapter 1), Enrique Camarena Salazar (Chapter 2), Rebecca O'Connell (Chapter 3), Kristen Lea Harrison (Chapter 4), Emilita Reeves (Chapter 8), Joann Curley (Chapter 9), Earl Washington, Jr. (Chapter 14).

C. Included in the syllabus is a report in which students will be asked to read a work of fiction or view one fictional representation forensic science from TV, movies or a computer game. The students will report on their reading or viewing of the work of fiction and in a report discuss on how chemistry and forensic is portrayed. In the bibliography, the following non-textbook sources will be used in lectures and as the basis for this report: Also as part of some lectures portions of *CSI: Criem Scene Investigation* episodes related to a specific topic will be shown to illustrate how accurately or inaccurately chemistry and forensics science are portrayed.

1. *CSI: Crime Scene Investigations*, The First Seven Seasons (2000-2007)
2. *CSI: Miami*, The First Five Seasons (2002-2007)
3. *CSI: NY*, The First Three Seasons (2003-2007)
4. *Quincy, M. E.,* The Complete Series (1976-1983)
5. *Bones*, Season 1 and 2 (2005-2006)
6. *Sherlock Holmes: The Complete Novels and Stories*, by Sir Arthur Conan Doyle, Bantam Classics (1986)
7. *Body of Evidence* by Patricia Cornwell, Pocket Books (2004)
8. *The Bone Collector* by Jeffrey Deaver, Coronet Books (1997)
9. *Deja Dead* by Kathy Reichs. Pocket Star Books (1998)
10. *CSI: 3 Dimensions of Murder and CSI 4: Hard Evidence*, Ubisoft (2006-2007)
11. *The CSI: NY Virtual Experience in Second Life*, http://alpha.cbs.com/primetime/csi_ny/second_life

D. This course applies the basic concepts of chemistry to the study of forensic science. The chemistry topics included in this course are presented at a level that requires no previous chemistry course. As stated in the preface of the required text *Criminalisitics: Forensic Science and Crime*, "It places forensic science within the framework of the basic principles of chemistry, biology and physics and assumes the reader has little or no scientific background."

CHECK LIST -- NATURAL SCIENCES (Non-laboratory)

Knowledge Area Criteria which the course must meet:

__X__ Treat concepts, themes and events in sufficient depth to enable students to appreciate the complexity, history and current implications of what is being studied; and not be merely cursory coverage of lists of topics.

__X__ Suggest the major intellectual questions/problems which interest practitioners of a discipline and explore critically the important theories and principles presented by the discipline.

__X__ Allow students to understand and apply the methods of inquiry and vocabulary commonly used in the discipline.

__X__ Encourage students to use and enhance, wherever possible, the composition and mathematics skills built in the Skill Area of Liberal Studies.

Natural Science Criteria which the course must meet:

__X__ Examine a body of knowledge of natural science that will contribute to an understanding of the natural world.

__X__ Provide an understanding of the development of natural science theories and their modification.

__X__ Teach students to formulate and test hypotheses.

__X__ Provide an understanding of some of the "great moments" in the history of natural science and the individuals, including women and minorities, responsible for them.

Additional Natural Science Criteria which the course should meet:

__X__ Encourage an appreciation of the complex interrelationship of natural science with the life of the individual.

__X__ Develop in students the abilities necessary to cope with the consequences of natural science in the modern world.

__X__ Develop an inquiring attitude consistent with the tenets of natural science, an attitude that is willing to expose fallacy on the basis of reason, that demands evidence for scientific assertions and yet is tolerant of hypotheses in the absence of contradictory evidence.