SOUTHEAST MISSOURI STATE UNIVERSITY
COURSE SYLLABUS

Instructor: TBA Course No. CH420/620

Title of Course: Forensic Chemistry

I. Catalog Description and Credit Hours of the Course

Applications of the principles, methods, and instrumentation of chemistry to forensic problems. Covers topics most commonly applicable to the everyday functions of a crime laboratory professional. Three lectures and two hour lab. (4)

II. Pre or Corequisites

CH420: CH271 Quantitative Analysis; CH341/342 Organic Chemistry I and Organic Chemistry Laboratory I.
CH620: CH540 Fundamentals of Organic Chemistry; CH571 Fundamentals of Quantitative Analysis; or appropriate undergraduate preparation as evidenced by performance on organic chemistry and quantitative analysis placement examinations.

III. Purposes or Objectives of the Course

A. To provide a general overview of the prevalent chemical principles, methods, and instrumentation involved in the analysis of physical evidence.

B. To emphasize instruction and experience in the most commonly employed chemical and instrumental methods of forensic analysis.

C. To lay a suitable foundation of knowledge and experience to prepare the student to pursue advanced study in forensic science or to succeed as an entry-level forensic scientist in the workforce.

D. To paint a realistic picture of the day-to-day functions of a crime laboratory professional, in contrast to the picture portrayed by popular television programs.

E. To emphasize the importance of sound science and ethics in the analysis of forensic evidence and in the reporting of the findings of such analyses.

IV. Expectations of Students

A. All students are expected to attend three 1-hour lectures and one 2-hour laboratory session per week.

B. All students are expected to read assigned materials before coming to class, including laboratory procedures to be performed.

C. All students are expected to rigorously maintain accurate records of all laboratory work performed and the results of that work.

D. Graduate students are expected to complete a semester-long independent study project to include written and oral presentations based upon forensic chemistry papers or case studies taken from the literature.

E. Students are required to adhere to the University's policies on academic honesty. As college students and responsible members of society it is imperative that you maintain your integrity at all times. This is all the more true for individuals who aspire to enter the

field of forensic science. Absolute integrity is essential to the functioning of a forensic scientist, and thus to the criminal justice system as a whole. I will defer to the official University policies on academic honesty found in the Undergraduate Bulletin and the Student Code of Conduct. Any students found in violation of any of these policies will be afforded due process but will be dealt with to the fullest extent allowable under said policies.

V. Course Content and Outline

Lecture Topic	**Weeks**
Part One: Setting the Stage	**3**
Introduction to Forensic Chemistry	
Statistics, Sampling, and Data Quality	
Multivariate Statistics, Calibration, and Quality Assurance	
Part Two: Essential Elements of Forensic Chemistry	**3**
Sample Preparation and Chromatography	
Instrumentation and Microscopy	
Part Three: Drug Analysis and Toxicology	**3**
Drugs and Pharmacology	
Forensic Drug Analysis I: Acidic Drugs	
Forensic Drug Analysis II: Basic Drugs	
Part Four: Chemical Analysis of Physical Evidence	**3**
Chemistry of Combustion I: Arson	
Chemistry of Combustion II: Explosives and Gunshot Residue	
Chemistry of Color: Inks and Paint	
Chemistry of Polymers: Fibers, Paper, Plastics, and Adhesives	
In-Class Presentations by Graduate Students	**1**

Laboratory	**Weeks**
Experiments marked ***GR*** denote activities for graduate students only Experiments marked ***UG*** denote activities for undergraduate students only	
Part One: Setting the Stage	
Check-In; Precision and Accuracy in Measurements	1
Classification of Vegetable Oils by Principal Component Analysis of FTIR Spectra	2
*Tour of Southeast Missouri Regional Crime Laboratory—**UG***	*1*
*Additional Work on Vegetable Oils Analysis—**GR***	*1*
Part Two: Essential Elements of Forensic Chemistry	
Thin-layer and column chromatography	1
Practice in the Use of the Microscope	1
Part Three: Drug Analysis and Toxicology	
Qualitative Spot Tests for Drug Analysis	1
Acid-Base Extraction of a Drug Mixture	1
Clean-Up and Identification of a Drug Sample	1
*Additional Drug Identity Confirmatory Tests—**GR***	*1*
Part Four: Chemical Analysis of Physical Evidence	

Arson Detection by GC Headspace Analysis	2
Detection of Explosive and Metal Residues	1
Examination of Textile Fibers	1
Additional experiment—to be chosen by student—GR	*3*

VI. Textbook and Other Required Materials or Equipment

Forensic Chemistry by Suzanne Bell (Pearson/Prentice Hall, 2005)

Laboratory materials paid for by your special course fee of $ 10.00

VII. Basis for Student Evaluation

The weight of evaluation criteria may vary at the discretion of the instructor and will be indicated at the beginning of each course.

Component	**CH420 (%)**	**CH620 (%)**
Homework (4)	16	15
Quizzes (4)	5	4
Labs (10)	24	27
Exams (4)	44	36
Paper	0	9
Final Exam	11	9
Total	100	100

Grading Scale (%)		
A	90	90
B	80	80
C	70	70
D	--	60
F	0	0

VIII. Programs Served by the Course

BS in Chemistry with Forensic Chemistry Concentration (CH420)
BA in Chemistry with Forensic Science Concentration (CH420)
BA in Chemistry with FBI DNA Analyst Concentration (CH420)
MNS in Applied Chemistry—Forensic Option (CH620)