COURSE SYLLABUS

LAST REVIEW	Spring 2021
COURSE TITLE	Forensic Science Analytical Techniques
COURSE NUMBER	CHEM-0201
DIVISION	Math, Science, Business & Technology
DEPARTMENT	Chemistry
CIP CODE	24.0101
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 3
PREREQUISITES	CHEM-0112, College Chemistry and Lab or concurrent enrollment
COURSE PLACEMENT	Students must meet the correct placement measure for this course. Information may be found at: https://www.kckcc.edu/admissions/information/mandatory-evaluation-placement.html

COURSE DESCRIPTION
This course is designed for the student who will be a science major in the field of Forensic Science. It starts with an introduction to the role of the expert witness and emphasizes throughout proper procedures for the handling of evidence. It incorporates three major laboratory processes within the criminal investigative processing of evidence. The principle and laboratory techniques of FT-IR, GC/MS and Electrophoresis will be covered in relationship to Forensics.

TEXTBOOKS
http://kckccbookstore.com/

METHODS OF INSTRUCTION
A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE
I. The Expert Witness
   A. Role
   B. Qualifications

C. Traits, Professional Ethics
D. Rules of Evidence
E. Evidence Handling Procedures
F. Prerogatives
G. Basic Terminology

II. Theory of Spectrometry
A. Properties of light and the electromagnetic spectrum
B. Types of spectroscopy
C. Interaction of electromagnetic radiation with samples

III. FT-Infrared Spectroscopy
A. Theory behind FT-IR
B. FT-IR Methods/Use
C. Analysis of Forensic Samples
D. Identification of Samples
E. Trouble Shooting the Instrument

IV. Gas Chromatography
A. Basic Principles and Methods of chromatography
B. The most common detection methods used in gas chromatography
C. Gas chromatography methods
1. Techniques for the introduction of samples
2. Standards
3. Trouble Shooting the Instrument

V. Gas Chromatography/Mass Spectrometry
A. Theory behind GC/MS
B. GC/MS Methods
1. Sample Preparation
2. Sample Dilution
3. Standards
4. Identification of Samples
5. Trouble Shooting the Instrument

VI. DNA Sample Analysis
A. Polymerase Chain Reaction
B. Genetic Markers
C. Restriction Fragment Length Polymorphism
1. Restriction Enzymes
2. Electrophoresis
3. Autoradiography/Luminescence Techniques

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

A. Demonstrate an understanding of the role of an expert witness.
1. The learner will be able to demonstrate an understanding of the role of an expert witness.

2. The learner will be able to demonstrate knowledge of the qualifications of an expert witness.
3. The learner will be able to demonstrate and use the ethical principles of an expert witness.

B. Demonstrate the proper use of the FT-IR for sample identification.
4. The learner will be able to demonstrate knowledge of the rules of evidence.
5. The learner will be able to demonstrate an understanding of basic legal terminology.
6. The learner will be able to handle and document samples for testing in a legally acceptable manner.
7. The learner will be able to discuss electromagnetic radiation in terms of its interaction with matter.
8. The learner will be able to demonstrate the proper use of the IR spectrometer
9. The learner will be able to develop methods for the preparation of a sample on the FT-IR.
10. The learner will be able to develop methods for the running of a sample on the FT-IR.
11. The learner will be able to interpret IR spectra of simple organic compounds.
12. The learner will be able to trouble shoot problems with the FT-IR

C. Demonstrate the proper use of the GC-MS for sample identification.
13. The learner will be able to demonstrate the proper use of the GC-MS.
14. The learner will be able to develop methods for the preparation of a sample on the GC-MS.
15. The learner will be able to develop methods for the running of a sample on the GC-MS.
16. The learner will be able to interpret GC-MS spectra of simple organic compounds.
17. The learner will be able to trouble shoot problems with the GC-MS
18. The learner will be able to predict the IR spectra of simple organic compounds.
19. The learner will be able to predict the MS of simple organic compounds.
20. The learner will be able to discuss the technique/theory of the PCR.
21. The learner will be able to use PCR methods for the amplification of DNA samples.
22. The learner will be able to demonstrate an understanding of the use of restriction enzymes.
23. The learner will be able to demonstrate the ability to prepare gel electrophoresis samples.
24. The learner will be able to demonstrate the ability to run gel electrophoresis samples.
25. The learner will be able to demonstrate the ability to use Luminescence/Autoradiography detection procedures.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES
Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES
Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.