DATE OF LAST REVIEW: 02/2013

CIP CODE: 24.0101

SEMESTER: Departmental Syllabus

COURSE TITLE: Introduction to Forensic Science and Laboratory

COURSE NUMBER: CHEM-0101

CREDIT HOURS: 5

INSTRUCTOR: DEPARTMENTAL SYLLABUS

OFFICE LOCATION: DEPARTMENTAL SYLLABUS

OFFICE HOURS: DEPARTMENTAL SYLLABUS

TELEPHONE: DEPARTMENTAL SYLLABUS

PREREQUISITE(S): None. High School Algebra or Elementary Algebra, MATH-0099, strongly recommended.

REQUIRED TEXT AND MATERIALS: Contact the Bookstore for the current textbook and supporting materials for this course.

COURSE DESCRIPTION: This course introduces the basic principles and relationships between the applications of chemistry to forensic science as they relate to the criminal investigative process. The course is designed to give students insight into the many areas of forensic science and how chemistry and other sciences play a role. Areas included are blood analysis, hair analysis, firearms and identification, fiber comparisons, paints, glass compositions, soil comparisons, and seminal fluid analysis. Upon completion of this course students should understand the potential value of forensic science and also the limitations.

METHOD 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, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE:
I. Forensic Science – What is it.
II. Chemistry – How is it related to Forensic Science
   A. Definition of Chemistry
      1. Differences between the Branches of Chemistry
   B. Scientific Measurement
      1. Metric System
      2. Qualitative versus Quantitative
      3. Temperature °C/°K/°F
      4. Density
III. Crime Scene
   A. Physical evidence
   B. Physical and Chemical Properties
      1. Periodic Table
      2. Chemical Compounds
      3. Formulas
      4. Nomenclature

IV. Analysis of evidence
   A. Main Differences between Inorganic and Organic Chemistry
      1. Inorganic Chemistry
         a. Three states of matter
         b. Solution chemistry
            1) % concentrations
            2) Molarity
            3) PH
      2. Organic Chemistry
         a. Aliphatic
            1) Alkanes, alkenes, alkynes
            2) Various functional groups
         b. Aromatic
            1) Benzene ring
            2) Functional groups
         c. Spectroscopy
            1) FT-IR
            2) GC-MS
         d. Chromatography
            1) Gas
            2) Thin layer
            3) Paper
            4) Column
         e. Biochemistry
            1) Drugs
            2) Serology
            3) Serums

V. Types of evidences
   A. Hair
   B. Fibers
   C. Drugs
   D. Blood
   E. Fingerprints
   F. Gun powder
   G. Serums
   H. Paints

VI. Laboratories
   A. Density of glass
   B. Use of the microscope
   C. Emission spectra
   D. Breathalyzer
   E. Blood typing in the ABO system
   F. Test for acid phosphatase in rape examination samples.
   G. Examine for and identify spermatozoa in rape examination samples
   H. Screen for drugs using micro-chemical techniques and TLC.
I. Perform acid and/or basic extracts to purify drugs.
J. Acid base titration/pH measurement
K. Know the principles of analysis of documents
L. Utilize the comparison and polarizing microscope to compare hairs and fibers evidence
M. Lift latent fingerprints and compare them to samples of known prints
N. Compare bullets recovered from discharged firearms utilizing the comparison microscope
O. Lift a shoeprint from soil by preparing a plaster cast and comparing it with an inked shoeprint
P. Restore an obliterated serial number from metal

EXPECTED LEARNER OUTCOMES:
1. The student will be able to describe the role of the criminalist in forensic science.
2. The student will be able to demonstrate an understanding of the collection and preservation of physical evidence.
3. The student will be able to demonstrate and understanding of the application of chemical methods to forensic investigation.
4. The student will be able to demonstrate the use of basic laboratory equipment for the investigation of forensic samples.

COURSE COMPETENCIES:
1. The student will be able to restate the central objectives of chemistry and their relation to forensic science.
2. The student will be able to state the roles of the criminalist and the laboratory in the science of law enforcement.
3. The student will be able to describe the differences between the branches of chemistry.
4. The student will be able to identify the three states of matter and properties of the three states of matter.
5. The student will be able to describe and collect both qualitative and quantitative data.
6. The student will be able to distinguish chemical and physical properties.
7. The student will be able to distinguish between gases, liquids, and solids and explain how the states differ at the molecular level.
8. The student will be able to distinguish the difference between elements, compounds and mixtures.
9. The student will be able to identify the common units for length, mass, temperature, volume density, time, and pressure in the SI (metric system and in the English system.
10. The student will be able to solve problems using the following metric prefixes: mega, kilo, centi, milli, micro, and nano.
11. The student will be able to explain how elements are arranged in the periodic table.
12. The student will be able to define density.
13. The student will be able to illustrate the use of the density formula.
14. The student will be able to assign the appropriate name to compounds, given the formula for that compound.
15. The student will be able to interpret molecular formulas, structural formulas, and Lewis structures.
16. The student will be able to write/interpret a balanced chemical equation given a set of reactants and products.
17. The student will be able to demonstrate an understanding of the gas laws.
18. The student will be able to calculate pressure, volume, temperature, and molar amounts using the universal gas law.
19. The student will be able to measure the concentration of a given solution.
20. The student will be able to solve dilution problems.
21. The student will be able to define the terms, acid and base.
22. The student will be able to distinguish acids from bases.
23. The student will be able to describe the use of the pH scale.
24. The student will be able to define molarity, molality, and normality.
25. The student will be able to define and distinguish between aliphatic and aromatic chemistry.
26. The student will be able to classify organic compounds into functional-group families.
27. The student will be able to define and identify alkanes, alkenes, alkynes, and cyclo-
28. The student will be able to convert between structural formulas, condensed formulas and line formulas.
29. The student will be able to describe the importance of functional groups to chemical activity.
30. The student will be able to assemble a sample strand of DNA.
31. The student will be able to explain the process of DNA replication.
32. The student will be able to explain the process of transcription.
33. The student will be able to explain the process of translation.
34. The student will be able to list four types of body fluids and the composition of each.
35. The student will be able to describe the composition and function of blood in the human body.
36. The student will be able to list the various components of urine.
37. The student will be able to illustrate what metabolism/neuronal transmission is and the basic mechanisms which control metabolism.
38. The student will be able to illustrate how different classes of drugs disrupt metabolism/neuronal transmission.
39. The student will be able to list the parts of the microscope and their function.
40. The student will be able to outline the steps required to live a fingerprint.

ASSESSMENT OF LEARNER OUTCOMES:
Student assessment is evaluated by means of classroom participation, daily preparation, announced exams, unannounced and announced quizzes, laboratory reports, laboratory unknowns, and a 2-hour comprehensive final.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student’s progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college’s policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact Valerie Webb, in Rm. 3354 or call at: 288-7670 V/TDD.