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Chemistry (CHEM) 1520 Introduction to Organic and Biochemistry (4 Units) CSU:UC

Prerequisite: Successful completion of Chemistry 1510 or equivalent

Prerequisite knowledge/skills: Before entering the course the student should be able to

1. Understand, explain, and demonstrate the logical problem solving methods of chemistry,
2. Understand pertinent examples, analogies, and special topics used to introduce and illustrate basic chemical concepts,
3. Analyze the fundamentals of chemistry to obtain an enhanced understanding of the physical world,
4. Identify the way science solves problems and apply the use of the scientific method, and
5. Understand the basic concepts of chemistry with sufficient proficiency to allow for the study of more advanced chemistry concepts.

Advisory: Eligibility for English 1500

Total Hours: 48 hours lecture, 48 hours lab (96 hours total)

Catalog Description: This course is a survey of organic and biochemistry for nursing majors and other allied health fields. Topics include general organic chemistry and biological chemistry as they apply to living systems. C-ID: CHEM 102.

Type of Class/Course: Degree Credit

Lecture Text: Seager, Spencer L., and Michael R. Slabaugh. *Organic and Biochemistry for Today*. 8th ed., Brooks/Cole, 2014.

Laboratory Manual: Seager, Spencer L. and Michael R. Slabaugh. *Custom Lab Manual for Chem 1520*. Cengage, 2016.

Seager, Spencer L., and Michael R. Slabaugh. *Safety Scale Experiments for Today*. 8th ed., Brooks/Cole. 2014. Print.

Course Objectives:

By the end of the course, a successful student will be able to

1. Draw and name structures containing common mono-functional organic molecules and differentiate functional groups when they appear in an organic structure, relate the physical and chemical properties of compounds containing these groups with the structure of each functional classification;

2. Distinguish roles of four major classes of bio-molecules in living cells,
3. Compare and contrast the processes of DNA replication and transcription, RNA translation, and common types of mutations; and
4. Demonstrate knowledge of major biochemical components in metabolism.

Course Scope and Content: Lecture

Unit I	Hydrocarbons
	A. Nomenclature
	B. Structure
	C. Physical Properties
	D. Chemical Properties
Unit II	Alcohols, Ethers, and Thiols
	A. Nomenclature
	B. Structure
	C. Physical Properties
	D. Chemical Properties
Unit III	Aldehydes and Ketones
	A. Nomenclature
	B. Structure
	C. Physical Properties
	D. Chemical Properties
Unit IV	Carboxylic Acids, Esters and Amides
	A. Nomenclature
	B. Structure
	C. Physical Properties
	D. Chemical Properties
Unit V	Amines
	A. Nomenclature
	B. Structure
	C. Physical Properties
	D. Chemical Properties
Unit VI	Carbohydrates
	A. Stereochemistry
	B. Monosaccharides
	C. Disaccharides
	D. Polysaccharides
Unit VII	Proteins

- A. Amino acids
- B. Chemical properties
- C. Protein structure

Unit VIII      Lipids

- A. Classification of lipids
- B. Fatty acids
- C. Structure of fats and oils

Unit IX        Nucleic Acids

- A. Structure
- B. Replication
- C. Transcription
- D. Translation

Unit X         Metabolism

- A. Digestion
- B. Glycolysis
- C. Citric acid cycle
- D. Fates of pyruvate

Course Scope and Content: Laboratory

The laboratory component of this course provides hands-on practical experience with organic and biochemistry. Laboratory exercises are designed to familiarize students with common equipment, instrumentation and techniques as they qualitatively and quantitatively explore and expand on principles presented in lecture.

Unit I          Structure

- A. Hydrocarbons
- B. Stereoisomerism
- C. Alcohols and ethers
- D. Aldehydes and ketones

Unit II         Separations

- A. Purification processes
- B. Liquid-liquid extraction
- C. Chromatography
- D. Distillations

Unit III        Reactions

- A. Hydrocarbons
- B. Alcohols
- C. Aldehydes and ketones

D. Carboxylic acids, esters and amides

Unit IV Characterization

- A. Boiling point
- B. Melting point
- C. Chemical testing
- D. Instrumental analysis

Unit V Biochemistry

- A. Carbohydrates
- B. Lipids
- C. Amino acids and proteins
- D. Nucleic acids

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 6 hours per week outside of the regular class time doing the following:

1. Studying text, chapter handouts and learning objectives
2. Answering questions
3. Skill practice
4. Completing required reading
5. Problem solving activity or exercise
6. Written work

Methods of Instruction:

1. Assign reading topics in the text book and in the reference books present in our library
2. Class lectures will be used to clarify and extend the theoretical and factual concepts present in the text
3. Multimedia presentations, relative to some unit of study will be shown to supplement lecture materials
4. Problem sets and questions from the text will be assigned
5. Demonstration experiments and lecture demonstrations will be used in the classroom and laboratory

Methods of Evaluation:

1. Substantial writing assignments including:
  - a. Essay Exams
  - b. Laboratory reports
2. Computational or non-computational problem-solving demonstrations including:
  - a. Exams
  - b. Homework problems
  - c. Quizzes
  - d. Laboratory reports

3. Other examinations, including:
  - a. Multiple choice
  - b. Matching items
  - c. True/false items
  - d. Completion

Laboratory Category: Extensive Laboratory

Pre delivery criteria: All of the following criteria are met by this lab.

1. Curriculum development for each lab.
2. Published schedule of individual laboratory activities.
3. Published laboratory activity objectives.
4. Published methods of evaluation.
5. Supervision of equipment maintenance, laboratory setup, and acquisition of lab materials and supplies.

During laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is physically present in lab when students are performing lab activities.
2. Instructor is responsible for active facilitation of laboratory learning.
3. Instructor is responsible for active delivery of curriculum.
4. Instructor is required for safety and mentoring of lab activities.
5. Instructor is responsible for presentation of significant evaluation.

Post laboratory activity of the laboratory: All of the following criteria are met by this lab.

1. Instructor is responsible for personal evaluation of significant student outcomes (lab exercises, exams, practicals, notebooks, portfolios, etc.) that become a component of the student grade that cover the majority of lab exercises performed during the course.
2. Instructor is responsible for supervision of laboratory clean up of equipment and materials.

Supplemental Data:

TOP Code:	190500: Chemistry, General
SAM Priority Code:	E: Non-Occupational
Distance Education:	Not Applicable
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable

Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	NO
Eligible for Pass/No Pass:	NO
Taft College General Education:	CSB2: CSU Area B2 CSB3: CSU Area B3 IG5B: IGETC Area 5B IG5C: IGETC Area 5C