## Course Syllabus

## CHEM 2425; CHEM 2425L – Organic Chemistry I I

**Catalog Description:** A study of the general principles of the chemistry of carbon. This course is designed for students in science and pre-professional programs. The course of study focuses on the alkenes, alkynes, aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives, polycyclic and heterocyclic compounds, carbohydrates, amino acid and proteins. (Lab Fee)

**Prerequisites:** CHEM 2425

**Semester Credit Hours:** 4
**Lecture Hours per Week:** 3
**Laboratory Hours per Week:** 4
**Contact Hours per Semester:** 105
**State Approval Code:** 4005045203

**Course Subject/Catalog Number:** CHEM 2425
**Course Title:** Organic Chemistry I I

**Course Curriculum:** State Criteria (those marked with an X reflect the state-mandated competencies taught in this course)

| **Basic Intellectual Competencies in the Core Curriculum** | |
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| ☒ | Reading |
| ☒ | Writing |
| ☒ | Speaking |
| ☒ | Listening |
| ☒ | Critical thinking |
| ☒ | Computer literacy |
| **Perspectives in the Core Curriculum** | |
| ☒ | Establish broad and multiple perspectives on the individual in relationship to the larger society and world in which he/she lives, and to understand the responsibilities of living in a culturally and ethnically diversified world. |
| ☒ | Stimulate a capacity to discuss and reflect upon individual, political, economic, and social aspects of |

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| | life in order to understand ways in which to be a responsible member of society. |
| ☒ | Recognize the importance of maintaining health and wellness. |
| ☒ | Develop a capacity to use knowledge of how technology and science affect their lives. |
| ☐ | Develop personal values for ethical behavior. |
| ☒ | Develop the ability to make aesthetic judgments. |
| ☒ | Use logical reasoning in problem solving. |
| ☒ | Integrate knowledge and understand the interrelationships of the scholarly disciplines. |

**Core Components and Related Exemplary Educational Objectives**

**Communication** (composition, speech, modern language)
The objective of a communication component of a core curriculum is to enable the student to communicate effectively in clear and correct prose in a style appropriate to the subject, occasion, and audience.

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| ☐ | To understand and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation. |
| ☐ | To understand the importance of specifying audience and purpose and to select appropriate communications choices. |
| ☐ | To understand and appropriately apply modes of expression, i.e. descriptive, expositive, narrative, scientific, and self-expressive, in written, visual, and oral communication. |
| ☐ | To participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding. |
| ☐ | To understand and apply basic principles of proficiency in the development of exposition and argument. |
| ☐ | To develop the ability to research and write a documented paper and/or to give an oral presentation. |

**Mathematics**
The objective of the mathematics component of the core curriculum is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-world problems.

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| ☒ | To apply arithmetic, algebraic, geometric, higher-order thinking, and statistical methods to modeling and solving real-world situations. |
| ☒ | To represent and evaluate basic mathematical information verbally, numerically, graphically, and symbolically. |
| ☒ | To expand mathematical reasoning skills and formal logic to develop convincing mathematical arguments. |
| ☒ | To use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results. |
| ☒ | To interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them. |
| ☒ | To recognize the limitations of mathematical and statistical models. |
| ☒ | To develop the view that mathematics is an evolving discipline, interrelated with human culture, and understand its connections to other disciplines. |

**Natural Sciences**

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| The objective of the study of a natural sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the bases for building and testing theories. | |
| ☒ | To understand and apply method and appropriate technology to the study of natural sciences. |
| ☒ | To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing. |
| ☒ | To identify and recognize the differences among competing scientific theories. |
| ☒ | To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies. |
| ☒ | To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture. |
| **Humanities and Visual and Performing Arts**<br>The objective of the humanities and visual and performing arts in a core curriculum is to expand students' knowledge of the human condition and human cultures, especially in relation to behaviors, ideas, and values expressed in works of human imagination and thought. Through study in disciplines such as literature, philosophy, and the visual and performing arts, students will engage in critical analysis, form aesthetic judgments, and develop an appreciation of the arts and humanities as fundamental to the health and survival of any society. Students should have experiences in both the arts and humanities. | |
| ☐ | To demonstrate awareness of the scope and variety of works in the arts and humanities. |
| ☐ | To understand those works as expressions of individual and human values within an historical and social context. |
| ☐ | To respond critically to works in the arts and humanities. |
| ☐ | To engage in the creative process or interpretive performance and comprehend the physical and intellectual demands required of the author or visual or performing artist. |
| ☐ | To articulate an informed personal reaction to works in the arts and humanities. |
| ☐ | To develop an appreciation for the aesthetic principles that guide or govern the humanities and arts. |
| ☐ | To demonstrate knowledge of the influence of literature, philosophy, and/or the arts on intercultural experiences. |
| **Social and Behavioral Sciences**<br>The objective of a social and behavioral science component of a core curriculum is to increase students' knowledge of how social and behavioral scientists discover, describe, and explain the behaviors and interactions among individuals, groups, institutions, events, and ideas. Such knowledge will better equip students to understand themselves and the roles they play in addressing the issues facing humanity. | |
| ☐ | To employ the appropriate methods, technologies, and data that social and behavioral scientists use to investigate the human condition. |
| ☐ | To examine social institutions and processes across a range of historical periods, social structures, and cultures. |
| ☐ | To use and critique alternative explanatory systems or theories. |
| ☐ | To develop and communicate alternative explanations or solutions for contemporary social issues. |
| ☐ | To analyze the effects of historical, social, political, economic, cultural, and global forces on the area under study. |
| ☐ | To comprehend the origins and evolution of U.S. and Texas political systems, with a focus on the growth of political institutions, the constitutions of the U.S. and Texas, federalism, civil liberties, and |

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| | civil and human rights. |
| ☐ | To understand the evolution and current role of the U.S. in the world. |
| ☐ | To differentiate and analyze historical evidence (documentary and statistical) and differing points of view. |
| ☐ | To recognize and apply reasonable criteria for the acceptability of historical evidence and social research. |
| ☐ | To analyze, critically assess, and develop creative solutions to public policy problems. |
| ☐ | To recognize and assume one's responsibility as a citizen in a democratic society by learning to think for oneself, by engaging in public discourse, and by obtaining information through the news media and other appropriate information sources about politics and public policy. |
| ☐ | To identify and understand differences and commonalities within diverse cultures. |

**Instructional Goals and Purposes:** Organic Chemistry is a two semester sophomore level course in the study of organic compounds and reactions. The second semester, Chemistry 2425, concentrates on the study of the reactions of organic chemistry. The study proceeds through the organic functional groups from alcohols to amino acids. Special attention is given to the classic synthesis reactions and named reactions. Mechanisms are stressed throughout and the problem solving is extended to include the mechanisms. Both semesters have a required laboratory component for credit. The laboratory meets once a week for four hours, with options for additional time, as needed. Laboratory exercises include experiments primarily to illustrate technique, experiments to perform synthesis and analysis, and exercises to provide experience in model development for both structure and theory. The lab is well equipped, with instruments for spectroscopy and chromatography experiments. A formal laboratory notebook is kept by each student. There is heavy emphasis on safety, proper handling and waste disposal of chemicals.

**General Course Objectives:**

1. Explain the general principles, laws, and theories of chemistry
2. Develop an awareness of the value of chemistry in our daily living
3. Use critical thinking and logic in the solution of problems
4. Explore chemical principles in the laboratory setting
5. Develop independent and cooperative learning skills
6. Recognize and acquire attitudes that are characteristic of the successful worker regardless of the major field of study

**Specific Course Objectives:**

1. Describe detailed mechanisms for common reactions: addition, elimination, substitution, free radical, and condensation.

2. Name and draw structures for organic molecules containing oxygen and sulfur sigma bonded to carbon atoms.

3. Describe sources, preparations and reactions of these substances.

4. Identify these substances using spectroscopic methods.

5. Describe properties of organic acids and nitriles, name these substances, and draw their structures.

6. Name, draw structures and describe reactions for organic molecules containing carbonyl compounds.

7. Identify amine and amide functional groups and describe in detail their important reactions, including reaction mechanisms.

8. Classify and describe the following classes of biomolecules: carbohydrates, amino acids, peptides, proteins, lipids, heterocycles, and nucleic acids.

9. Describe metabolic pathways from an Organic Chemistry perspective.

10. Describe pericyclic reactions.

11. Identify types of polymers and the mechanisms for their productions.

**Course Content:**
Students will be required to participate in and complete the following:

1. Students will participate in lecture activities including discussions, quizzes and in class assignments
2. Students will turn in assigned homework problems and questions
3. Students may turn in additional homework problems and questions for extra credit
4. Students may participate in optional cooperative learning groups
5. Students will participate in laboratory experiments and turn in laboratory reports
6. Students will complete five unit exams and one comprehensive final exam

**Methods of Instruction/Course Format/Delivery:** Lecture, class discussion, reading and homework problem assignments and laboratory experimentation

**Assessment:** The following components will be used to calculate a final grade for each student:

1. Homework- completion of assigned reading and problems from the textbook
2. Lecture Activities – participation in classroom discussions and practice problems, completion of quizzes

3. Laboratory Experiments – Laboratory experiments are to be completed each week during the laboratory period. Participation in the experiment is worth 40 points. A quiz about each experiment is given at the beginning of the lab period each week and is worth 10 points. Laboratory reports are due by the end of the lab period and are worth 50 points.
4. Unit Exams – Five unit exams are given throughout the semester that are worth 100 points each. No one coming in late may start an exam after the first person has left. One unit exam may be made up at the end of the semester at a time designated by the instructor.
5. Final Exam – completion of a comprehensive test at the end of the semester

**Course Grade:** The final grade will be determined as follows:

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| Quizzes/Homework/In-Class Work | 20 % | A | >90 |
| Labs | 25 % | B | 80 - 89 |
| Exams | 30 % | C | 60 - 79 |
| Final Exam | 25 % | D | 50 – 59 |
| | | F | <50 |

**Textbook:**

1. *Organic Chemistry, 6th edition, by John McMurry, published by Brooks/Cole, 2004.*

2. *Experimental Organic Chemistry, by Clark F. Most, Jr., published by Wiley and Sons.*

**Other:**

- For current texts and materials, use the following link to access bookstore listings: http://www.panola.edu/collegestore.htm
- For testing services, use the following link: http://www.panola.edu/instruction/dl/testing.htm