MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE
COURSE OUTLINE

DEPT. CHEM **COURSE NUMBER: 2202**

NUMBER OF CREDITS: 5 **Lecture: 3 Lab: 2 OJT: 0**

Course Title:
Organic Chemistry II

Catalog Description:
Organic Chemistry II continues CHEM 2201 with emphasis on multistep organic synthesis, orbital interactions, structure determination, and reaction classes including addition, nucleophilic addition-elimination, aromatic substitution, pericyclic reactions, free radical reactions, and polymerization. This course is for students majoring in science, pre-engineering, or pre-health (medicine, pharmacy, veterinary medicine). This course includes a lab. Prerequisite: CHEM 2201.

FULFILLS MN TRANSFER CURRICULUM AREA(S) *(Leave blank if not applicable)*

Goal 3: Natural Sciences: _X_ by meeting the following competencies:

- Demonstrate understanding of scientific theories.
- Formulate and test hypotheses by performing laboratory, simulation, or field experiments in at least two of the natural science disciplines. One of these experimental components should develop, in greater depth, students' laboratory experience in the collection of data, its statistical and graphical analysis, and an appreciation of its sources of error and uncertainty.
- Communicate their experimental findings, analyses, and interpretations both orally and in writing.
- Evaluate societal issues from a natural science perspective, ask questions about the evidence presented, and make informed judgments about science-related topics and policies.

Prerequisites or Necessary Entry Skills/Knowledge:
CHEM 2201

Topics to be Covered
Radical reactions
Conjugation, resonance, and dienes
Benzene and aromatic compounds
Reactions of aromatic compounds
Carboxylic acids and the acidity of the O−H bond
Carbonyl chemistry: organometallic reagents, oxidation and reduction

Aldehydes and ketones: nucleophilic addition
Carboxylic acids and their derivatives: nucleophilic acyl substitution
Substitution reactions of carbonyl compounds at the α carbon
Carbonyl condensation reactions
Amines
Amino acids and proteins
Carbohydrates
Lipids
Carbon-carbon bond-forming reactions in organic synthesis
Pericyclic reactions
Synthetic polymers

Student Learning Outcomes
Predict properties and reactivity of organic molecules using concepts of molecular structure, formal charge, and resonance
Translate between compound names and representations of structure
Create and employ 3-dimensional structures to determine the constitutional and stereochemical isomeric relationships between molecules
Identify various functional groups within complex molecules, correlate physical properties with functional group structure, and predict relevant reactions each functional group will undergo
Predict the products of *oxidation, reduction, aromatic substitution, nucleophilic acyl addition, nucleophilic acyl substitution, and alpha carbon (enol and enolate)* reactions through the application of thermodynamic and kinetic principles
Create logical synthetic strategies by combining reactions into practical multi-step sequences
Propose reaction mechanisms using the curved-arrow formalism
Employ data from *NMR, IR, and UV-VIS spectroscopy* and *mass spectrometry* to identify compounds and demonstrate an understanding of how each of these analytical techniques work
Identify structures and functions of macromolecules
Plan organic chemical reactions using proper reaction stoichiometry calculations
Perform successful organic chemical reactions with hands-on use of reaction glassware and equipment, practicing proper laboratory technique to maximize product yield and purity
Separate and purify chemical compounds
Determine the identity of organic samples through physical and spectroscopic methods
Determine the qualitative and quantitative purity of organic samples through physical and spectroscopic methods
Model the scientific method by performing inquiry- or research-based laboratory experiments or projects in which the student makes decisions regarding experimental design and execution
Demonstrate responsible laboratory safety and waste handling practices including the use of proper fume hoods or fume extraction for chemicals that emit hazardous vapors
Communicate the procedure, results, and relative success of an experiment with respect to the experimental objectives in the form of a laboratory notebook, written reports, or verbal presentation

Is this course part of a transfer pathway: Yes X No	

Revised 10/21