

# MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE

## COURSE OUTLINE

DEPT. CHEM

COURSE NUMBER: 2201

NUMBER OF CREDITS: 5

Lecture: 3 Lab: 2 OJT: 0

<b>Course Title:</b>
Organic Chemistry I

<b>Catalog Description:</b>
Organic Chemistry I covers the structure, classification, and fundamental reactions of carbon compounds. Specific topics include molecular structure, nomenclature, isomerism, reaction mechanisms, and reaction classes including proton transfer, nucleophilic substitution, elimination, and alkene addition. This course is for students majoring in science, pre-engineering, or pre-health (medicine, pharmacy, veterinary medicine). This course is the first semester in a two-semester organic chemistry sequence. This course includes a lab. Prerequisite: CHEM 1101.

### 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.

<b>Prerequisites or Necessary Entry Skills/Knowledge:</b>
CHEM 1101

<b>Topics to be Covered</b>
Structure and bonding
Acids and bases
Organic molecules and functional groups
Conformational and constitutional isomers
Alkanes
Stereochemistry

Mass spectrometry, infrared spectroscopy, and nuclear magnetic resonance spectroscopy
Organic reactions
Alkyl halides and nucleophilic substitution
Alkyl halides and elimination reactions
Alcohols, ethers, and related compounds
Alkenes
Alkynes
Oxidation and reduction

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	
Analyze the relative energies of molecular structures	
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 <i>acid-base</i> , <i>substitution</i> , <i>elimination</i> , and <i>addition</i> 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 <i>IR and NMR spectroscopy</i> to identify organic compounds, and develop an understanding of how each of these analytical techniques work	
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	<input checked="" type="checkbox"/>	No	<input type="checkbox"/>
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