

**Department:**

Viticulture and Enology

**Course Description:**

This course will explore the interrelated chemical, biological, and physical mechanisms that are critical to wine production. This class will expand upon topics taught in Intermediate Enology, providing students with an understanding of the roles of microorganisms, the role of the physical and chemical treatments, and the various decisions that are presented to the winemaker throughout the lifetime of the wine. Laboratory analyses of a practical and useful nature are chosen to demonstrate various chemical, physical, and biochemical methods.

**Course Competencies:**

Upon completion of the course, the student should be able to:

1. Demonstrate basic knowledge of the principles of wine microbiology.
2. Explain the roles of positive and negative microorganisms encountered in wine production.
3. Describe the growth and control of various grape and wine microorganisms.
4. Describe the microbiological and biochemical processes involved in alcoholic fermentation.
5. Describe the microbiological and biochemical processes of MLF.
6. Demonstrate basic understand of how spoilage microorganisms in wine are diagnosed.
7. Describe the importance of chemical analyses in the overall health of wine.
8. Describes processes used to prevent undesirable microorganism activity in wines.
9. Describe the process involved in collecting a wine sample for send out to a microbiology laboratory.
10. Describe and demonstrate the process for routine testing soluble solids (Brix), pH, titratable acidity.
11. Describe and demonstrate the process for testing free and total sulfur.
12. Describe and demonstrate the process on finished wine for testing volatile acidity, alcohol, residual sugar, and dissolved oxygen.
13. Describe and demonstrate the testing for cold and heat stability.
14. Describe and demonstrate the purpose of bench trials.
15. Describe and demonstrate the testing for fining, acid, and sugar trials.
16. Describe and demonstrate the purpose and techniques of blending.
17. Demonstrate an understanding of wine clarification and fining techniques on microbial populations and on organoleptic qualities of a wine.
18. Explain the importance of winery sanitation to preserve wine quality.
19. Demonstrate an understanding of biochemical processes based on intended wine style.
20. Explain applicable governmental and trade regulations.

**Course Content:**

- A. Wine Components and Their Reactions
  - a. Water and Ethanol
  - b. Carbohydrates
  - c. Acids
  - d. Minerals
  - e. Amines, Amino Acids, and Proteins
  - f. Higher Alcohols
  - g. Esters
  - h. Isoprenoids
  - i. Aldehydes, Ketones, and Related Compounds
  - j. Thiols and Sulfur Related Compounds
- B. Introduction to Phenolics
  - a. Volatile Phenols
  - b. Non-flavonoid Phenolics
  - c. Flavan-3-ols and Condensed Tannin
  - d. Flavonols
  - e. Anthocyanins
  - f. Sulfur Dioxide
  - g. Taints, Off-flavors, and Mycotoxins
- C. Chemistry of Wine Production Processes
  - a. Outline of Wine Production
  - b. Grape Must Composition Overview
  - c. Maceration and Extraction of Grape Components
- D. The Biochemistry of Wine Fermentations
  - a. Grape-Derived Aroma Precursors
  - b. Wine Oxidation
  - c. Topics Related to Aging
  - d. The Chemistry of Post-fermentation Processing
  - e. Additives and Processing Aids

## Learning Assessments:

Course competencies will be assessed by the use of portfolios and presentations, written examinations, laboratory and field observations, class projects and activities, active participation in course dialog, and scholarly activities including discovery, application, and integration.

## Instructional Materials:

Waterhouse, Andrew Leo, Gavin L. Sacks, and David W. Jeffery. 2016. *Understanding Wine Chemistry*. Wiley & Sons. ISBN: 978-1-118-62780-8

### **Guidelines for Requesting Accommodations Based on Documented Disability or Medical Condition**

It is the intention of Highland Community College to work toward full compliance with the Americans with Disabilities Act, to make instructional programs accessible to all people, and to provide reasonable accommodations according to the law.

Students should understand that it is their responsibility to self-identify their need(s) for accommodation and that they must provide current, comprehensive diagnosis of a specific disability or medical condition from a qualified professional in order to receive services. Documentation must include specific recommendations for accommodation(s). Documentation should be provided in a timely manner prior to or early in the semester so that the requested accommodation can be considered and, if warranted, arranged.

In order to begin the process all students **must** complete the "Disabilities Self-Identification Form" on our [Disability Services website](#).

This form can also be accessed at the Highland Community College homepage under Students Services/Student Resources/Disability Service or by contacting the Disabilities Coordinator.

#### **A Note on Harassment, Discrimination and Sexual Misconduct**

Highland Community College seeks to assure all community members learn and work in a welcoming and inclusive environment. Title VII, Title IX, and College policy prohibit harassment, discrimination and sexual misconduct. Highland Community College encourages anyone experiencing harassment, discrimination or sexual misconduct to talk to report to the Vice President for Student Services, the Human Resources Director or complete an [online report](#) about what happened so that they can get the support they need and Highland Community College can respond appropriately.

There are both confidential and non-confidential resources and reporting options available to you. Highland Community College is legally obligated to respond to reports of sexual misconduct, and therefore we cannot guarantee the confidentiality of a report, unless made to a confidential resource. Responses may vary from support services to formal investigations. As a faculty member, I am required to report incidents of sexual misconduct and thus cannot guarantee confidentiality. I must provide our Title IX coordinator with relevant details such as the names of those involved in the incident. For more information about policies and resources or reporting options, please review our [Equity Grievance Policy](#).