

Las Positas College
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Course Outline for VWT 23
FUNDAMENTALS OF WINE SCIENCE
Effective: Fall 2018

I. CATALOG DESCRIPTION:

VWT 23 — FUNDAMENTALS OF WINE SCIENCE — 3.00 units

This course covers the chemistry and microbiology of winemaking including the use of yeasts and enzymes, primary and secondary fermentation management, wine micro-organisms, phenolic compounds, color chemistry, aging and flavor development. There will be a focus on wine faults: the causes and corrections. Students under the age of 21 must have a declared major of either viticulture and/or enology to participate in any tasting activities as stated in the California State Assembly Bill 1989.

3.00 Units Lecture

Grading Methods:

Letter Grade

Discipline:

- Agriculture Production or
- Chemistry

| | MIN |
|-----------------------|------------|
| Lecture Hours: | 54.00 |
| Total Hours: | 54.00 |

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

IV. MEASURABLE OBJECTIVES:

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

- A. Describe how wine chemistry impacts a wine's color, aroma, flavor, balance, stability and quality
- B. Explain wine composition and list the chemical families found in grapes and wine
- C. Summarize the use of sulfur-dioxide in must and wine treatment
- D. Outline the process of the primary fermentation
- E. Outline the process of the secondary fermentation
- F. Explain how different bacteria can develop in wine
- G. Illustrate the process of "micro-oxygenation"
- H. Describe post-fermentation wine treatments used for stabilization and clarification
- I. Explain the reductive and/or oxidative qualities found in (bottle, barrel or tank) aged wine
- J. Describe the sensory attributes of the most common wine taints

V. CONTENT:

- A. The process of wine production stressing wine chemistry:
 1. How chemistry can be harnessed to enhance wine color, aroma, flavor, balance, stability and quality
 2. The characterization and enumeration of yeast, bacteria and molds common to juice and wine environments and their impact on wine quality and stability
- B. Wine composition and components
 1. Each chemical family that can be found in grapes and wine
 2. Basic chemical properties and their contributions to wine stability and sensory properties
- C. Sulfur-dioxide
 1. The use of Sulfur dioxide in must and wine treatment
 2. Products and methods complementing the effect of sulfur dioxide
 3. Sulfur-dioxide and how it impacts the balance of pH and titratable acidity
- D. Primary fermentation:
 1. How yeasts work and how they can be influenced to achieve better results
 2. Cytology, taxonomy and ecology of grape and wine yeasts
 3. Major bio-chemical reactions that occur during alcoholic fermentation
 4. Feral yeasts
 5. Conditions of yeast development
 6. Metabolic pathways of wine yeasts
 7. Indigenous and commercially available Yeasts
 - a. Nutrient requirements
 - b. Re-hydration and inoculation
- E. Secondary fermentation:

1. Indigenous and commercially available bacterias
 - a. Nutrient requirements
 - b. Re-hydration and inoculation
- F. Bacterial development in wine
 1. Lactic acid bacteria
 2. The metabolism of lactic acid bacteria
 3. Lactic acid bacteria development in wine
 4. Acetic acid bacteria
 5. Acetic acid bacteria development in wine
- G. Micro-oxygenation
- H. Wine stabilization and fining, additives and processing aids
- I. Wine aging
 1. The evolution of wine flavor and color
 2. The nature of the weak fixation of aromatic compounds in wine - and the significance of their release upon bottle opening
 3. Flavor modification post bottle
 4. The shelf-life of wine as part of wine aging
- J. Off flavors, taints, faults and flaws
 1. Tri-chloroanisole 2,4,6
 2. Brettanomyces
 3. Volatile acidity
 4. Lactobacillus

VI. METHODS OF INSTRUCTION:

- A. **Guest Lecturers** -
- B. **Observation and Demonstration** -
- C. **Audio-visual Activity** -
- D. **Discussion** -
- E. **Lecture** -
- F. **Classroom Activity** -

VII. TYPICAL ASSIGNMENTS:

- A. Read "Micro-oxygenation: A Necessity for Success?" and complete the homework questions.
- B. Write a two page research paper about feral yeasts.
- C. Working with an assigned group, assemble evidence that would argue to ***not*** use sulfur-dioxide during the wine making process and prepare to debate in class.
- D. For your final project, research a wine taint, fault or flaw (not covered in class) and present your findings; include the causes, the impact on aromas and flavor, practices that would protect against contamination or infection and the treatment of the problem.

VIII. EVALUATION:

- A. **Methods**
 1. Exams/Tests
 2. Quizzes
 3. Papers
 4. Projects
 5. Class Participation
 6. Home Work
 7. Final Performance
- B. **Frequency**
 1. At least two exams/quizzes/tests per semester
 2. At least one written paper (approximately 2-4 pages) per semester
 3. Daily class participation
 4. Weekly homework
 5. Final presentation of semester project

IX. TYPICAL TEXTS:

1. Goode, Jamie. *The Science of Wine: From Vine to Glass*. 1st ed., University of California Press, 2014.
2. Jackson, Ronald. *Wine Science, Fourth Edition: Principles and Applications*. 4th ed., Academic Press, 2014.
3. Bolton, Roger, Vernon Singleton, Linda Bisson, and Ralph Kunkee. *Principles and Practices of Winemaking*. 2nd ed., Springer Publishing, 2010.
4. Grainger, Keith, and Hazel Tattersall. *Wine Production and Quality*. 2nd ed., Wiley Blackwell, 2016.
5. Smith, Clark. *Post Modern Wine Making; Rethinking the Modern Science of an Ancient Craft*. 1st ed., University of California Press, 2014.
6. Iland, Patrick, Nick Bruer, Greg Edwards, and Sue Caloghris. *Chemical Analysis of Grapes and Wine: Techniques and Concept*. 2nd ed., Patrick Iland Wine Promotions, 2013.
7. Waterhouse, Andrew, Gavin Sacks, and David Jeffery. *Understanding Wine Chemistry*. 1st ed., Wiley Blackwell, 2016.
8. Neel, D. Pub "Practical Winery and Vineyard Journal." 2017.
9. Neel, D. Pub "Wines and Vines." 2017.
10. Wine Communications Group Inc. Pub "Wine Business Monthly." 2017.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Chemical splash goggles