VWT-272: FUNDAMENTALS OF WINE CHEMISTRY & MICROBIOLOGY

Effective Term
Fall 2025

CC Approval
02/07/2025

AS Approval
02/13/2025

BOT Approval
02/20/2025

COCI Approval
05/15/2025

SECTION A - Course Data Elements

CB04 Credit Status
Credit - Degree Applicable

Discipline

Minimum Qualifications	And/Or
Agricultural Production (Any Degree and Professional Experience)	

Subject Code
VWT - Viticulture and Winery Technology
Course Number
272

Department
Viticulture and Winery Technology (VWT)

Division
Career Education and Workforce Development (CEWD)

Full Course Title
Fundamentals of Wine Chemistry & Microbiology

Short Title
Wine Chemistry & Microbiology

CB03 TOP Code
0104.00 - *Viticulture, Enology, and Wine Business

CB08 Basic Skills Status
NBS - Not Basic Skills

CB09 SAM Code
C - Clearly Occupational

Rationale
This is an update to a long standing Viticulture and Winery technology course.

SECTION B - Course Description

Catalog Course Description
Chemistry and microbiology of winemaking, this course includes: the use of enzymes and yeasts; fermentation management; wine micro-organisms; phenols; aging; flavor development, and wine stability.

SECTION C - Conditions on Enrollment

Open Entry/Open Exit
No

Repeatability
Not Repeatable

Grading Options
Letter Grade or Pass/No Pass

Allow Audit
Yes

Requisites

SECTION D - Course Standards

Is this course variable unit?
No

Units
3.00

Lecture Hours
54.00

Outside of Class Hours
108

Total Contact Hours
54

Total Student Hours
162

Distance Education Approval

Is this course offered through Distance Education?
Yes

Online Delivery Methods

DE Modalities	Permanent or Emergency Only?
Entirely Online	Emergency Only
Hybrid	Permanent

SECTION E - Course Content

Student Learning Outcomes

	Upon satisfactory completion of the course, students will be able to:
1.	Explain basic principles of wine chemistry and microbiology.
2.	Demonstrate skills required in the workplace.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1.	Explain the fermentation of grape juice into wine.
2.	Plan and implement a successful alcoholic fermentation.
3.	Define the differences between red and white wine fermentations with a focus on phenolics and stability.
4.	Describe the secondary malolactic fermentation and its effect on wine style.
5.	Assess the effect of different bacteria and molds on wine style and quality.
6.	Evaluate the effect of different yeasts on wine style.
7.	Demonstrate knowledge of the nutritional needs of yeasts.
8.	Explain the use of Botrytis bunch rot in winemaking.
9.	Explain the role of yeast autolysis in 'Methode Champenoise' winemaking.
10.	Create sanitation plans to prevent undesirable effects caused by microorganisms without increasing the risks of cork taint.
11.	Use basic microbiological techniques to view and manage yeast populations.
12.	Define key phenolic and other wine quality components such as tannin, anthocyanin, flavonols, isoprenoids etc.
13.	Estimate the effect of oxygen and lees on wine style and quality.
14.	Implement plans to create high quality wine styles with different amounts of phenolics.
15.	Explain the relationship of anthocyanin, tannins and flavonols in wine color and stability.
16.	Discuss the importance of pH and titratable acidity in wine color and stability.
17.	Describe the use of enzymes in certain winemaking styles.
18.	Create a plan to secure long term wine stability.

Course Content

1. Fermentation processes and dynamics
2. Differences between red and white wine fermentation dynamics
3. Yeasts, bacteria and molds in musts and wines
4. Microbiological practices in the winery
5. Indigenous yeasts
6. Differences among commercially available yeasts
7. Nutrient requirements of yeasts
8. Preventing sluggish and stuck fermentations
9. Malolactic fermentation dynamics
10. Uses of "Botrytis cinerea" in winemaking
11. Role of yeast autolysis in sparkling wines
12. Causes and control undesirable microorganisms in wine
13. Proper sanitation techniques
14. Titratable acidity and pH
15. The role of TA and pH in red wine color stability
16. The chemistry of cork taint and associated risk factors
17. Oxygen and lees management in wines
18. Tannins, anthocyanins and flavonols
19. Phenolics and wine quality
20. Red wine color
21. Wine flavors
22. Smoke taint components
23. Osmosis and filtration chemistry
24. The relationship of yeasts and alcohol
25. Long term wine stability

Methods of Instruction

Methods of Instruction

Types	Examples of learning activities
Discussion	Discussion on the relationship of yeast nutrition and alcohol levels to stuck fermentations.
Lecture	Lecture on the polymerization of tannins with anthocyanins and flavonols in wine.

Instructor-Initiated Online Contact Types

Announcements/Bulletin Boards
Chat Rooms
Discussion Boards
E-mail Communication
Telephone Conversations
Video or Teleconferencing

Student-Initiated Online Contact Types

Chat Rooms
Discussions
Group Work

Course design is accessible

Yes

Methods of Evaluation

Methods of Evaluation

Types	Examples of classroom assessments
Exams/Tests	A midterm examination consisting of true/false, multiple choice and essay questions. A final examination consisting of true/false, multiple choice and essay questions.

Assignments

Reading Assignments

Assigned reading from the textbook (example: "Fermentation" chapter from Wine Science).

Assigned reading from the textbook (example: "Post fermentation Treatments and Related Topics" from Wine Science).

Writing Assignments

Writing:

Essay or short paper (example: an essay question on the midterm examination in which the student describes the role of yeast during primary alcohol fermentation).

Problem Solving:

Essay or short paper (example: an essay question on the final examination in which the student selects from alternative management methods for the control of spoilage yeasts and justifies the choice for a real or a hypothetical winery).

Other Assignments

Identification of healthy vs stressed yeast populations using microscopy, and fermentation chemistry.

SECTION F - Textbooks and Instructional Materials

Material Type

Textbook

Author

Andrew Waterhouse, Gavin Sacks and David Jeffrey

Title

Understanding Wine Chemistry

Edition/Version

2nd

Publisher
Wiley

Year
2024

Rationale
Appropriate to subject matter

Material Type
Textbook

Author
Ronald S. Jackson

Title
Wine Science

Edition/Version
5th

Publisher
Academic Press

Year
2020

Rationale
Appropriate to subject matter

Course Codes (Admin Only)

ASSIST Update
No

CB00 State ID
CCC000147453

CB10 Cooperative Work Experience Status
N - Is Not Part of a Cooperative Work Experience Education Program

CB11 Course Classification Status
Y - Credit Course

CB13 Special Class Status
N - The Course is Not an Approved Special Class

CB23 Funding Agency Category
Y - Not Applicable (Funding Not Used)

CB24 Program Course Status
Program Applicable

Allow Pass/No Pass
Yes

Only Pass/No Pass
No