

FS 466 Wine Microbiology and Processing Laboratory (1 cr) Fall Semester 2015

LABORATORIES	F 2:10 to 5 pm in the Food Science and Human Nutrition Building. <ul style="list-style-type: none">• Student Winery (room G20)• Presentation Area (room 103/155)• Student Laboratory (room 303)
PREREQUISITES	Current or past enrollment with a passing grade in FS 465/565 Wine Microbiology and Processing Lecture is <u>required</u> .
INSTRUCTOR	Dr. Charles G. Edwards 320 Food Science Human Nutrition Building 509-335-6612 or edwardsc@wsu.edu
OFFICE HOURS	Call/email for an appointment but avoid the hour prior to lectures or laboratories (instructor preparation time).
REQUIRED TEXT	Edwards, C.G. 2015. <i>FS 466 Wine Microbiology and Processing Laboratory Manual</i> , Washington State University, Pullman, WA. Available at Crimson & Gray (800-469-2998).
RECOMMENDED TEXTS	Fugelsang, K.C. and C.G. Edwards. <i>Wine Microbiology: Practical Applications and Procedures</i> . Second edition. Springer Science and Business Media, NY (2007). Available at www.amazon.com . Edwards, C.G. <i>Illustrated Guide to Microbes and Sediments in Wine, Beer, and Juice</i> . WineBugs LLC, Pullman, WA (2005). Available from GusmerEnterprises (www.gusmerenterprises.com or RPachelbel@gusmerenterprises.com).
TEACHING ASSISTANT	Zachary Cartwright (zachary.cartwright@wsu.edu) and Michael Taylor (michael.h.taylor@wsu.edu).
COURSE SYNOPSIS	FS 466 Wine Microbiology and Processing Laboratory is designed to assist in understanding material presented in the corresponding lecture (FS 465/565) by providing a hands-on approach to wine fermentations. The course will focus on familiarization with winemaking processes and equipment along with methods of chemical and microscopic analyses.
REQUIRED MATERIALS	Safety glasses MUST be worn at all times when in laboratory or processing wine. Though a pair will be provided for each student, students can choose to bring their own safety glasses. Clothing should be comfortable, avoiding loose items (scarves, jewelry, etc.) or open-toed shoes. Be sure to wear clothing suitable for being stained or soiled during processing days as winemaking can be very messy.
ATTENDANCE POLICY	Make-up laboratories will not be available. Unexcused absences from a laboratory period or the field trip will result in a 25-point reduction in participation score. A penalty of 10 points/day will be assessed for those reports that are turned in after specified due dates and times. Laboratory and winery space will be open during non-meeting times to allow analysis of wines during the semester. Contact one of the teaching assistants for scheduling information.

COURSE OUTLINE

<u>Date</u>	<u>Lab#</u>	<u>Exercises</u>
Aug 28	1	Introduction and tour (room 103/155). <ul style="list-style-type: none">• Review syllabus (including revised schedule; wines to be made this semester).• Overview on winemaking.• Discuss record-keeping assignment.• Review chemical/microbiological analyses for unknown #1 and #2 wines.• Unknown #1 wines available for analyses.• Tour student winery and laboratory facilities.
Sept 4	2	Exercise B: Must and wine analyses [chemistry] (rooms 103/155). <ul style="list-style-type: none">• Record-keeping assignment due (each group should email one .doc file to edwardsc@wsu.edu. File will be forwarded to TTB for grading).• Assign white/red treatment wines for processing.• Assign students to harvest white grapes next week.• Unknown #1 wines available for analyses.
Sept 11	3	Exercise C: White grape fermentations (room G20). <ul style="list-style-type: none">• White wine processing.• Half of the class travels to Prosser to harvest white grapes on the prior Thursday (September 10) in preparation for class the next day.• TTB comments for record-keeping assignment returned.• Unknown #1 wines available for analyses.
Sept 18	4	Exercise C (rooms 103/155) <ul style="list-style-type: none">• Continue processing & analyses of white wines (class discussion on fermentations)• Assign students to harvest redgrapes next week.• Unknown #1 wine report due.
Sept 25	5	Exercise C: Red grape fermentations (room G20). <ul style="list-style-type: none">• Red wine processing.• Half of the class travels to Prosser to harvest red grapes on the prior Thursday (September 24) in preparation for class the next day.• Continue processing & analyses of white wines (class discussion on fermentations)
Oct 2	6	Exercise C (room G20). <ul style="list-style-type: none">• Continue processing & analyses of white/red wines (class discussion on fermentations)
Oct 9	7	Exercises A: Must and wine analyses [microbiology] (rooms 103/155). <ul style="list-style-type: none">• Continue processing & analyses of white/red wines (class discussion on fermentations)• Microscope training (yeast & bacteria)

- Oct 16 8 Exercises A: Must and wine analyses [microbiology] (rooms 103/155).
- Continue processing & analyses of white/red wines (class discussion on fermentations).
 - Continue unknown #2 wine analysis.
- Oct 23 9 Exercises A: Must and wine analyses [microbiology] (room G20).
- Continue processing & analyses of white/red wines (class discussion on fermentations).
 - Continue unknown #2 wine analysis.
- Oct 30 10 Exercises A: Must and wine analyses [microbiology] (room G20).
- Continue processing & analyses of white/red wines.
 - Continue unknown #2 wine analysis.
- Nov 6 11 Exercise A: Must and wine analyses [chemistry] (rooms 103/155).
- Continue processing & analyses of white/red wines (class discussion on fermentations).
 - Lecture about analytical chemistry (J.K. Fellman).
 - Unknown #2 wine report due.
- Nov 13 12 Exercise A: Must and wine analyses [chemistry] (rooms 103/155).
- Continue processing & analyses of white/red wines (class discussion on fermentations).
 - Wine faults (blind sensory tasting).
- Nov 20 13 Exercise D: Finishing operations (room G20).
- Continue processing & analyses of white/red wines.
 - Written processing reports due.
- Nov 27 THANKSGIVING HOLIDAY
- Dec 4 14 Oral group reports (rooms 103/155).
- Dec 11 15 Oral group reports (rooms 103/155).

GRADING

Analysis of unknown #1 wines report	20
Analysis of unknown #2 wines report	100
Processing written/oral reports (white & red wines)	
Written	150
Oral	50
Laboratory	50
Includes general techniques, participation, and the record-keeping proposal	
	<hr/>
Total points possible	370

<u>Grade</u>	<u>% of Total Points</u>
A	>93.0
A-	90.0 – 92.9
B+	87.0 – 89.9
B	83.0 – 86.9
B-	80.0 – 82.9
C+	77.0 – 79.9
C	73.0 – 76.9
C-	70.0 – 72.9
D+	67.0 – 69.9
D	60.0 – 66.9
F	<59.9

INSTRUCTIONAL METHODS

This course will stress an understanding of concepts and principles learned in lecture towards the manufacture of wines under various conditions using an independent “hands-on” approach. At the beginning of the semester, basic analytical methods used by wineries will be taught in order to learn how to diagnose quality problems during vinification. Student groups (two per group) then will be assigned three white wines and three red wines to prepare under specific conditions to demonstrate the impact of fermentations on wine quality (*i.e.*, fermentation temperatures, presence of oak chips, etc.). General guidance for processing will be provided but the instructor will not directly provide answers to student asked questions regarding processing options. Rather, the students will be encouraged to share their professional view(s) of the issue and then to logically work through the problem to arrive at a possible answer (frequently, there is more than one answer). All processing decisions will be made by the student groups and must be defended when the wines are presented to fellow students and faculty at the end of the semester.

LEARNING OBJECTIVES

At the end of this course, a student will be able to:

1. Identify typical processing unit operations used to prepare white and red wines.
2. Construct and implement logic schemes towards analysis of a contaminated wine.
3. Understand the impact of processing treatments on white and red wine quality.
 - a. Develop a record-keeping scheme to be applied in winemaking.
 - b. Apply principles taught in FS 465 lecture towards preparing wines under different processing schemes.

- c. Explain and interpret changes to fermentation and ultimately wine quality based on changes to processing.

ANALYSIS OF UNKNOWN #1 WINES

1. Description

For this exercise, student groups will be given a wine for chemical analysis. Using the methods described in the ***FS 466 Wine Microbiology and Processing Laboratory Manual***, determine and report pH (page 33), titratable acidity (page 35), volatile acidity (page 39), and ethanol (page 58) of the wine sample. The amount of wine provided will be finite (no “refills”).

For each analytical variable measured, scores will assigned as follows:

<u>Deviation from Mean</u>	<u>Points Awarded</u>
≤1 standard deviation	5
≤2 standard deviation	4
≤3 standard deviation	3
>3 standard deviation	0

2. Format of written report

Reports should be brief (<2 pages) but include data, replicates, and calculations. Be sure to express concentrations using correct units. Each student group should work as a team for the analysis of the wines while individual members within a group will prepare and write their own report. Provide a hard (paper) copy for grading purposes as electronic versions will not be accepted.

UNKNOWN #1 WINE REPORT

September 18, 2015 by 5:00 pm (PST)

ANALYSIS OF UNKNOWN #2 WINES

1. Description

For this exercise, you are a wine microbiologist working for a large winery that has a problem with a wine in a tank. To simulate a potential spoilage problem, your student group will be given two wines (250 mL each); one a control wine and the other inoculated with a spoilage microorganism(s). Using a range of sensory, chemical, and microbiological analyses described in the laboratory manual (Edwards 2012), student groups will identify which wine sample was spoiled and what microorganism(s) were present. Microorganisms potentially present could be: (a) *Saccharomyces*, (b) *Brettanomyces*, (c) non-*Saccharomyces* yeasts (*i.e.*, *Kloeckera*, *Pichia*, *Candida*, or *Zygosaccharomyces*), (d) *Oenococcus*, (e) *Pediococcus*, (f) *Lactobacillus*, and/or (g) *Acetobacter*. For sensory testing, only smelling is allowed (NO tasting).

Refer to pages 8 to 9 of the **FS 466 Wine Microbiology and Processing Laboratory Manual** for more information about the assignment. Analytical methods to be used are detailed throughout the laboratory manual.

2. Format of written report

Formats will vary but should include a cover memorandum to a “fictional boss” attached to your technical report. The report should include title, author, executive summary, purpose/objectives, procedures (can cite the laboratory manual), data/results of the experiments, discussion, and conclusions/recommendations. Citation of references that help support your results and conclusions is very strongly encouraged. Do not cite FS 465/565 Lecture Notes, the instructor, or laboratory partners as references. Caution should be exerted if using the internet to find citations (information should be refereed by non-biased referees as those used in publishing original research). All reports should be typed with double spacing. Use of headers within the reports is highly encouraged. Reports must be submitted in hard copy format rather than by electronic means (the instructor is not responsible for printing).

When approaching a technical problem, it is important to know as much about the problem as possible before attempting to implement a solution. Thus, there may be additional questions regarding the production of the wines in order to make recommendation(s) to the winery on how to handle the contaminated sample. Be sure to describe these questions in the report and explain why answers to these questions will help solve the problem. Processing control methods that should be implemented by the winery need to be discussed in the report. Student groups may propose additional analytical methodology if necessary.

Each student group should work as a team towards the analysis of the wines while individual members within a group will prepare and write their own report. Although it would be ideal for all members of a student group to agree on conclusions and recommendations, this may not always be the situation. Whether members agree or not, individual reports must provide adequate support for the conclusions presented. Provide a hard (paper) copy for grading purposes as electronic versions will not be accepted.

UNKNOWN #2 WINE REPORT

October 30, 2015 by 5:00 pm (PST)

PROCESSING WRITTEN/ORAL REPORTS

1. Description

Student groups will develop a record keeping scheme to document each step of processing their white and red wines. The approach will be forwarded to an official in the United States Alcohol and Tobacco Tax and Trade Bureau (TTB) who has legal jurisdiction regarding winery records.

General feedback will be provided to students that should be incorporated into wine processing and final reports.

Refer to pages 10 to 12 of the ***FS 466 Wine Microbiology and Processing Laboratory Manual*** for more information related to wine treatments and report information.

2. Format of approach to record-keeping/written processing report

Students will write a brief one-page outline of how each group will maintain records of wine processing. Be sure to include an example “spread sheet” or “form” to illustrate how records will be kept.

For Part I within the final report, a complete discussion of how records were maintained plus the actual records will be required. In Part II, the student group will present data and discuss the results of the various treatments imposed on the white and red wines made during the semester.

Though each student group should work as a team towards the analysis of the wines, members within a group will prepare and write their own report. The technical report will include title, author, executive summary, purpose/objectives, procedures (in detail as to what the group exactly did), data/results of the experiments, and conclusions. Use of a cover memo to a “fictional boss” is optional.

Citation of at least three references supporting your results is required. While two of the references may be a textbooks, at least one reference should be from a refereed journal describing original data. Do not cite FS 465/565 Lecture Notes, the instructor, or your laboratory partners as references. All reports should be typed with double spacing. Use of headers within the reports is highly encouraged. Provide a hard (paper) copy for grading purposes as electronic versions will not be accepted.

RECORD-KEEPING DRAFT

September 4, 2015 by 5:00 pm (PST)

FINAL PROCESSING REPORT

November 20, 2015 by 5:00 pm (PST)

3. Format of oral report

Student groups will orally present results from their wine fermentation experiments during the last one to three laboratory periods of the course. Each presentation will be 30 minutes in length, followed by questions from fellow students and faculty for up to an additional 30 minutes.

FS 466 ORAL PRESENTATION EVALUATION

Presenters' Names: _____

Group Number: _____

Date: _____

Final Score: _____

1. Depth of discussing fermentation treatments (were reasonable arguments presented? Were references and other information used to explain treatments?)

1 2 3 4 5 6 7 8 9 10 (points)

2. Overall logic and clarity of ideas (presentation easy to follow and understand?)

1 2 3 4 5 6 7 8 9 10 (points)

3. Appropriate use of visual aids (too many/too few and readability?)

1 2 3 4 5 6 7 8 9 10 (points)

4. Evidence of teamwork (did the group work together?)

1 2 3 4 5 6 7 8 9 10 (points)

5. Presentation of wines (appropriate set-up and organization?)

1 2 3 4 5 (points)

6. Handling of questions/comments (understanding beyond what was presented?)

1 2 3 4 5 (points)

7. Other comments

STUDENT POLICIES

Current academic policies and procedures can be found on the WSU Registrar website located at the following address: <http://www.registrar.wsu.edu/Registrar/Apps/AcadRegs.ASPX>.

Students with Disabilities

Reasonable accommodations are available for WSU students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

Reasonable accommodations are available for UI students who have documented temporary or permanent disabilities. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306 in order to notify your instructor(s) as soon as possible regarding accommodation(s) needed for the course. Contact DSS at www.access.uidaho.edu (email: dss@uidaho.edu; phone: 208-885-6307).

Academic Integrity

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The purpose of these standards and processes is to educate students and protect the welfare of the community. The standards of Conduct for Students can be found at <http://conduct.wsu.edu>. University instructors have the authority to intervene in all situations where students are suspected of academic dishonesty. In such instances, responsible instructors retain the authority to assign grades to students considering, from an academic standpoint, the nature of the student action. More information regarding responding to academic integrity violations can be found at <http://academicintegrity.wsu.edu/>. Feel free to contact the Office of Student Conduct (509-335-4532) if you would like more specific information about the process. Writing Programs (509-335-7959) can assist with proactive assignment design that minimizes intentional or unintentional academic dishonesty.

Cases of academic dishonesty shall be processed in accordance with academic integrity policies as stated in the *Washington State University Student Handbook, Faculty Manual* (WSU students) or the *University of Idaho Faculty Staff Handbook* (UI students). In general, avoid conversations with fellow students, do not read a newspaper or complete crosswords, and turn off cellular phones during class.

Safety

Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the "Alert, Assess, Act" protocol for all types of emergencies and the "Run, Hide, Fight" response for an active shooter incident. Remain *ALERT* (through direct observation or emergency notification), *ASSESS* your specific situation, and *ACT* in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI's *Run, Hide, Fight* video and visit the WSU safety portal.

PLAGIARISM

Plagiarism is defined by Webster's Dictionary as, "to steal and pass off the ideas or words of another as one's own." There are two general forms of plagiarism:

1. Unintentional: the use of other writers' words, phrases, sentences, paragraphs as though they were your own *without understanding* the need to cite the original source. Unintentional plagiarism normally occurs when the individual does not understand the conventions of scientific writing and the need to cite sources of information.
2. Intentional: the use of another writers' work and claiming it as your own. Intentional plagiarism includes *knowingly copying* or incorporating sections of books, articles, or other sources into your work without citation.

To evade plagiarism, you must acknowledge the source of information. In scientific writing, this can be performed in the text of your work through the use of surnames of authors and the year of publication (e.g., Smith et al., 2003) or by using numbers enclosed by parentheses which correspond to specific citations in the reference section. In addition to employing citations in the text, plagiarism can be avoided by applying special techniques when writing about information obtained from a source:

1. Paraphrase: rewording information in which you accurately present the main ideas from the source but do so using your own organization, words, and sentence structures.
2. Summary: a concise statement of the main idea from a section within a source.
3. Direct quotation: use of quotes surrounding the passage written by another author.

In general, paraphrasing (a) and the use of summary statements (b) are very common techniques used in scientific writing. Use of quotations (c) in scientific writing is rare and should be avoided.

Plagiarism is dishonest and is **not** tolerated. If caught using all or portions of a current or former classmate's writing or other sources of information (e.g., purchase a paper), a grade of "zero" will be given for the exercise. Additional penalties for plagiarism are possible as outlined in the *Washington State University Student Handbook*.

CONSUMPTION OF ALCOHOL-CONTAINING BEVERAGES

In accordance with state and federal laws, students below the age of 21 will NOT be allowed to orally consume any of the wines prepared. This policy will be strictly enforced.