

FS/VE 465/565 Wine Microbiology and Processing Lecture (3 cr) Fall Semester 2016

- LECTURES** MWF 12:10 to 1:00 pm.
CLARK room 151 (Pullman), Wine Science Center (TriCities), Prosser or Mount Vernon Northwestern Washington Research and Extension Center station (Mt. Vernon)
- RESEARCH DISCUSSIONS** One hour per week. Time/day/place to be determined (FS 565 **only**).
- PREREQUISITES** General microbiology (equivalent to MBioS 101 or 305) and general biochemistry (equivalent to MBioS 303) are required.
- INSTRUCTOR** Dr. Charles Edwards (509-335-6612 or edwardsc@wsu.edu).
Food Science Human Nutrition Building room 320.
- OFFICE HOURS** Call/email for an appointment but avoid the hour prior to lectures or laboratories (instructor preparation time).
- REQUIRED MATERIAL** Edwards, C.G. *Lecture notes: Scientific names, structures, pathways, and data*. FS 465/565, Washington State University, Pullman (2016). Available at Crimson & Gray (800-469-2998 or www.crimsongray.com).
- RECOMMENDED TEXTS** Fugelsang, K.C. and C.G. Edwards. *Wine Microbiology: Practical Applications and Procedures*. Second edition. Springer Science and Business Media, NY (2007). Available from www.amazon.com.
- Edwards, C.G. *Illustrated Guide to Microbes and Sediments in Wine, Beer, and Juice*. WineBugs LLC, Pullman, WA (2005). Available from www.gusmerenterprises.com.

COURSE OUTLINE

<u>Topics</u>	<u>Approximate number of lectures</u>
General information/SO ₂	2
Must & wine microorganisms	4
Harvest/must preparation	6
Examination I	1
Microbial nutrients/ecology/alcoholic fermentation	9
Sulfur/volatile compounds	4
Malolactic fermentation	2
Examination II	1
Finishing operations (racking, fining, stabilization)	6
Microbiological/chemical spoilage/other processing	9
Review of final exam and course evaluation	1

Final examination → **Monday, December 12, 2016** (1:00 to 3:00 pm)

CLASS PARTICIPATION/ATTENDANCE

Students are strongly encouraged to participate in lecture through (a) asking of questions and/or (b) providing ideas/thoughts in response to questions from the instructor.

In accordance with Academic Regulation 73, absences impede a student's academic progress and should be avoided. Those students who must miss a lecture for university-sponsored activities such as field trips, judging teams, sports, etc. must obtain an official Class Absence Request form from the faculty or staff member supervising the off-campus activity. Classes listed in the official university calendar as "to be arranged" (e.g., internships, work study, etc.) must be scheduled to avoid time conflicts with FS 465/565. Scheduling conflicts with employment and non-university activities will be considered unexcused absences.

Mid-term examinations will be scheduled one to two weeks before the intended dates based on majority vote of the students. This policy will hopefully limit conflicts due to student participation in other university-approved activities or having other scheduled examinations. However, the instructor reserves the right to ultimately decide examination dates if a majority decision cannot be easily reached. Make-up examinations will be available to those students with excused absences only. In these cases, the instructor must know of the intended absence for an examination three days prior to the examination date so a substitute examination can be written and the date for the examination established. Those students who miss an examination due to an unexcused absence will receive a score of zero ("0") for that examination.

CLASS CANCELLATIONS

Lecture will NOT be held on the following dates: September 5 (Labor Day), November 11 (Veterans Day), and November 22-25 (Thanksgiving).

GUEST LECTURES (TENTATIVE)

1. Good fermentation practices during Wednesday, October 5 (Gordon Specht, Lallemand).
2. Filtration basics on Wednesday, October 12 (Rodger Pachelbel, GusmerEnterprises).
3. Cooperage/barrels December 7 (Yuri DeLeon, World Cooperage).

LEARNING OBJECTIVES

At the end of this course, students will:

1. Identify typical processing unit operations used to prepare white and red wines.

Assessment → midterms and final written examinations

2. Understand the science behind winemaking.

Assessment → midterms and final written examinations

- a. Identify and compare various microorganisms found in grape must/wine and discuss impacts on quality given regional situations and conditions.
- b. Analyze desirable and undesirable microbial and chemical changes during vinification.
- c. Apply biochemical principles towards understanding microbial metabolism and ecology under vinification conditions.

3. Employ and integrate scientific knowledge to solve technical problems encountered in the wine industry.

Assessment → midterms and final written examinations

4. Critically review current original research literature (FS 565).

Assessment → research discussions (peer and instructor evaluation)

INSTRUCTIONAL METHODS

This course will stress an understanding of scientific concepts and principles so that critical thinking skills and scientific reasoning can be applied to solve hypothetical technological problems encountered by the global and local wine industry. Examinations feature “observation” questions that require providing scientific explanations based the principles taught in class. A technique used in lecture to improve participation will be a “question, discussion, and answer” approach. Rather than directly providing answers to student asked questions, the instructor will ask the student(s) their professional view(s) and to apply scientific reasoning towards arriving at a possible answer (frequently, there is more than one possible path to a viable answer). Though sometimes challenging for students and instructors, this strategy encourages critical thinking and scientific reasoning as opposed to the memorization of facts.

GRADING

Examination 1	100
Examination 2	100
Comprehensive Final Exam	<u>150</u>
	350 points (FS 465)
Research discussion	<u>50</u>
	400 points (FS 565)

<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

Dictionaries, cell phones, computers, ipods, or ANY other electronic equipment cannot be used, played, or consulted during examinations. Those students receiving the class at WSU-Prosser will need to travel to the WSU-TriCities campus to take examinations.

ADDITIONAL ASSIGNMENTS (FS 565 ONLY)

Examinations

Approximately 10 to 20% of each examination, primarily essay questions, will be different for students taking FS 465 and those in FS 565. Here, students taking FS 565 will be asked more “thought-provoking” questions, commonly based on required reading assignments of current research.

Discussion of current research

Once a week, graduate students and the instructor will discuss the assigned research papers. These papers are listed below and understanding this information will be required for examination purposes. Each student will be required to obtain their own copy of the paper and individual students will be assigned to lead the discussion. Discussions will be approximately 1.0 to 1.5 hours in length.

- Week 2 Establish format and schedule presentations/oral critiques.
- Week 5 Hausinger, K., M. Lipps, H. Raddatz, A. Rosch, G. Scholten, and D. Schrenk. 2015. Automated optical grape-sorting of rotten grapes: effects of rot infections on gluconic acid concentrations and glycerol/gluconic acid ratios in must and wine. *J. Wine Res.* 26: 18-28. DISCUSSION LEAD: _____
- Week 6 Kwasniewski, M.T., G.L. Sacks, and W.F. Wilcox. 2014. Persistence of elemental sulfur spray residue on grapes during ripening and vinification. *Amer. J. Enol. Vitic.* 65: 453-462. DISCUSSION LEAD: _____
- Week 7 Contreras, A., C. Curtin, and C. Varela. 2015. Yeast population dynamics reveal a potential ‘collaboration’ between *Metschnikowia pulcherrima* and *Saccharomyces uvarum* for the production of reduced alcohol wines during Shiraz fermentation. *Appl. Microbiol. Biotechnol.* 99: 1885-1895. DISCUSSION LEAD: _____
- Week 8 Enrique, M., A. Ibáñez, J.F. Marcos, M. Yuste, M. Martínez, S. Valles, and P. Manzanares. 2010. β -Glucanases as a tool for the control of wine spoilage yeasts. *J. Food Sci.* 75: M41-M45. DISCUSSION LEAD: _____
- Week 9 Barata, A., A. Nobre, P. Correia, M. Malfeito-Ferreira, and V. Loureiro. 2006. Growth and 4-ethylphenol production by the yeast *Pichia guilliermondii* in grape juices. *Am. J. Enol. Vitic.* 57: 133-138. DISCUSSION LEAD: _____
- Week 10 Gutiérrez, A., R. Chiva, M. Sancho, G. Beltran, F.N. Arroyo-López, and J.M. Guillamon. 2012. Nitrogen requirements of commercial wine yeast strains during fermentation of a synthetic grape must. *Food Microbiol.* 31: 25-32. DISCUSSION LEAD: _____
- Week 11 Mink, R. R. Koelling, S. Sommer, H.G. Schmarr, and M. Scharfenberger-Schmeer. 2015. Diacetyl formation by *Oenococcus oeni* during winemaking induced by exogenous pyruvate. *Am. J. Enol. Vitic.* 66: 85-90. DISCUSSION LEAD: _____
- Week 12 Hixson, J.L., N.R. Sleep, D.L. Capone, G.M. Elsey, C.D. Curtin, M.A. Sefton, and D.K. Taylor. 2012. Hydroxycinnamic acid ethyl esters as precursors to ethylphenols in wine. *J. Agric. Food Chem.* 60: 2293-2298. DISCUSSION LEAD: _____

All presentations will be evaluated by the instructor and peers using weighted criteria described on the last page of this syllabus. Be sure to bring a blank evaluation form to every presentation for submission to

the instructor. After each presentation, anonymous comments and scores from peers will be summarized and a final score assigned by the instructor.

STUDY HELP

As everyone has their own learning style, many differs in how to study for examinations. To help students with their studying, a professor at the State University of New York (Buffalo campus) has designed an excellent website titled, "How to study: A brief guide." The website contains information from how to take notes in lecture to studying ideas for examinations. If your grades are not what you would like them to be, see if there is information on this professor's website that could be useful:

<http://www/cse.buffalo.edu/~rapaport/howtostudy.html>

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*.

FS 565 DISCUSSION EVALUATION

Presenter's Name: _____ **Date:** _____ **Final Score:** _____

1. Adequate summary and background of research paper

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

2. Depth of critique and discussion (were reasonable arguments presented?)

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

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

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

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

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

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

1 2 3 4 5 (points)

6. Participation in other presentations (scored by Instructor at end of course)

1 2 3 4 5 (points)

7. Instructor comments