

CHEMISTRY 80 H

Introduction to Wine Science and Chemistry Course Organization

- INSTRUCTOR** Prof. Phil Crews, Rm. 362 PSB,
Office Hours: Tues 9-11:00AM or by appointment
EMAIL pcrews@ucsc.edu
- GENERAL** Chem. 80 is a General Education course with an emphasis in the Biological and Chemical Sciences subject matter areas.
- CLASS WEBSITE** Log in at canvas.ucsc.edu It contains the schedule, announcements and other useful information.
- MATERIALS** **REQUIRED TEXTS** [#1] S. Kolpan, B.H. Smith, M.A. Weiss, “Exploring wine” 3e (2010): Wiley ISBN: 978-0-471-77063-3; [#2] Repro Reader C.P. Meredith, A.L. Waterhouse, D.O. Adams, “Introduction to Winemaking”. These contain much less detail than discussed in lecture on the technical topics covered in the first half of the course and much more detail on the geographic topics that we cover in the second half. Be aware that the book may, at times, contradict information presented in lecture. In such cases, the lecture and web site information will be considered correct for the purposes of this course.
- COURSE FORMAT** Lectures Tu & Th 2 – 4 PM RM Soc Sci 1 145 (but could change), Three field trips TBA.
- HOMEWORK** None will be assigned in this class.
- QUIZZES** Two Quizzes, given during the quarter as noted in the syllabus (50 pts) and five in-class quizzes administered at random during the quarter (10 pts each).
- EXAMS** One Midterm Exam and a Final Exam. No makeups can be given. Students who miss an exam or quiz will receive no credit for that part of the course. Exceptions to this policy will be made only for extraordinary (and well-documented) circumstances. The midterm and the final will consist of both short answer and multiple choice questions. You will be held responsible for all material covered in the lectures. The textbook is intended to serve as a reference to help you to better understand the lecture but the tests will only include information in the text if it is not also covered in the lecture. The quizzes and the midterm will cover the material indicated on the lecture schedule. The final exam, however, will be comprehensive but will emphasize the latter half of the quarter.
- GRADES** The quality of your work will be based on the following information. It is important to: complete each quiz, orally contribute during class discussions and field trips, and complete each exam. **GRADING:** Quiz 1=50 pts Quiz 2=50 pts; In-class quizzes=50 pts; Midterm=100 pts; Final=100 pts.

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A Selected Reading List

Wine Chemistry

■ *Understanding Wine Chemistry* (2016) Andrew L. Waterhouse, Gavin L. Sacks, David W. Jeffery; Wiley.

■ An interesting reference text for scientifically trained winemakers, also useful for curious readers looking for examples of organic chemistry in everyday life. While this is not the first text on the chemistry of wine, its approach is unique because of the coverage of wine production practices emphasizing important wine constituents. Many reviewers of this text conclude it is unique because of the outline of a diverse range of possible winemaking outcomes through the viewpoint of fundamental bioorganic chemical processes.

Wine Making

■ *Principles and Practices of Winemaking* (1996/1999) Roger B. Boulton, Vernon L. Singleton, Linda F. Bisson, Ralph E. Kunkee; Chapman & Hall/Springer. ■ A classic text that offers a rigorous and complete guide to the technology of winemaking. The four UC Davis authors dissect the process of wine production, stressing the chemistry, biochemistry, microbiology and underlying science of enology. The book contains detailed discussion on every aspect of the wine production process, from the selection of grapes and preparation of the must and the juice, through aging, bottling and storage of finished wines. This book has been on my shelf since it was first published in 1996 and continues to be an indispensable source of practical instruction and information.

Wine Science

■ *Wine Science: Principles and Applications* (2014) Ronald S. Jackson; Elsevier Books. ■ This is my go to text for general and technical information. The Fourth Edition, covers the three pillars of wine science: grape properties, wine production, and sensory evaluation. It discusses grape anatomy, physiology and evolution, wine geography, wine and health, and the scientific basis of food and wine combinations. It also covers topics not found in other enology or viticulture texts, including details on cork and oak, specialized wine making procedures, and historical origins of procedures.

■ *The Art and Science of Wine* (2007) James Halliday, Hugh Johnson; Firefly Books. ■ A unique coverage of both the art and science behind winemaking. A wide range of topics begins with the fundamental role of terroir the complex combination of characteristics that give a wine its personality. Current developments in pruning and irrigation are then covered, along with the recent emergence of vineyards in cooler regions and the rise of organic wines. Wine production is summarized for nine specific styles, from light-bodied whites to full-bodied reds, along with sweet, sparkling and fortified varieties. The wide range of decision making encountered during winemaking is discussed. Other interesting issues especially the debate about the merits of natural cork, plastic cork and screw cap seals. The book also covers the balance of quantity vs. quality, mechanization, and the chemistry and analysis of wine.

■ *The Science of Wine – From Vine to Glass* (2005) Jamie Goode; UC Press. ■ A book whose goal is to merge hard science about wine with the emotional aspects that make wine appealing. Important details on scientific developments relating to the interplay between viticulture and enology. Also covered are practical applications of science to techniques that are used around the world, and how these issues are affecting the quality, flavor, and perception of wine. Engaging discussion can be found on a wide range of topics including terroir, biodynamics, the production of natural (aka manipulation-free) wines. Other topics include the potential effect of climate change on grape growing, the health benefits of wine. Topics continually being debated are here including including genetically modified grape vines, SO₂, the future of cork, and wine flavor chemistry.

Handy Guides

■ ***Jancis Robinson's Guide to Wine Grapes*** (1996); Oxford University Press. ■ I am constantly referring to this pocket sized book by Robinson, MW, that weights only 6.5 ounces. This work provides a handy, on-the-spot guide to the most central aspect of wine making--the grapes themselves. About 800 varieties are cataloged in this book and a myriad of synonyms are demystified. The first section "Grapes Do Matter" is concise but packed full of important principles such as how vine varieties vary. The main section lists each grape by name. One of my favorites is that describing Alicante Bouschet – it is unique and will be discussed during the lecture on California Wine History.

■ ***Wine Grape Varieties in California*** (2003) Larry J. Bettiga & Five other authors; UC Agriculture & Natural Resources Publication 3419. ■ There are 107 incredible photos for 53 grape varieties grown in California. Also included is information on ripening periods of varieties by period and growing district, detailed illustrations of grapevine structure abound. At center stage are the discussions of the 36 major wine grape varieties grown in the state, covering synonyms, source, physical characteristics such as clusters, berries, and leaves, harvest periods and methods, and winery use. Each variety is highlighted by close-up photography of its clusters, leaves, and leaf shoots. This is another favorite on my book shelf.

Descriptive Accounts

■ ***The Wine Bible***, Karen MacNeil (2015); Workman Publishing. ■ The latest edition is praised by many in the following ways "The most informative and entertaining book I've ever seen on the subject" (Danny Meyer), "A guide that has all the answers" (Bobby Flay), "Astounding" (Thomas Keller), and "A magnificent masterpiece of wine writing" (Kevin Zraly).

Fun Stuff

■ ***How to Fake Your Way through a Wine List – Tips and Tricks to Sound Like an Expert***. (2015) K. Cole; Sterling Epicure. ■ How about an approach that will let you sound knowledgeable about wines without cramming into you head endless facts and details about vintages, châteaux, and appellations! This pleasurable book provides a different way to understand wine without having to memorize an encyclopedia's worth of facts. The approach here involves finding wines similar to those you already like. There is an interesting directory organized by wine style, empowering vignettes, and tips on trying new wines. The author's goal is to provide tools to enable anyone to rapidly scan through a restaurant wine without being intimidated.

■ ***Wine by Style A practical guide to choosing wine by flavor, body, and colour*** (2006) Fiona Beckett; Octopus Publishing Group. ■ Wines are explored by taste rather than country of origin to build wine-drinking knowledge. Each chapter covers a main style—from whites and reds to rosés, from champagne and sparkling wines to fortified wines. Different flavors are explained with a comprehensive list of wines for each style and descriptions of where they are produced, the grapes they're made from, and what they taste like. There are also useful tasting notes, keys to flavors and price, and a useful chapter on pairing wine and food, serving and storing wine, and spotting faulty wines. The influence of climate and soil, and the effect of different winemaking techniques, are explored in full.

■ ***LIKE MODERN EDENS Winegrowing in Santa Clara Valley and Santa Cruz Mountains 1798-1981*** (1982) Charles Sullivan; CA History Center – Local History Studies Vol 28. ■ A book that is a must for those interested in the general history of the CA wine industry from mission days to the present. Documented are the pioneer days of the Santa Clara Valley and Santa Cruz Mts, which like Sonoma and Napa is the home of CA's premium wine industry. The pages have information about historic figures many of whom are the basis for the place names of SF Bay area landmarks.

Comprehensive Sources

■ **Oxford Companion to Wine** (2015), Jancis Robinson, MW; Oxford University Press. ■ It has nearly 4,000 entries with about 850 pages with contributions from 187 people. The book provides an alphabetically arranged discussion on wine, compiled and edited by Jancis Robinson, with contributions by several wine writers including Hugh Johnson, Michael Broadbent, and James Halliday, and experts such as viticulturist Richard Smart and oenologist Pascal Ribéreau-Gayon.

The New Sotheby's Wine Encyclopedia: The Classic Reference to the Wines of the World (2011) Tom Stevenson; Dorling Kindersley. ■ Some have described this as a “ tantalising read which will appeal to any serious wine drinker's palate.” This massive work spans 667 pages and covers wines From the Old World to the New. It describes all the emerging wine regions, provides the latest information on all the wine-producing areas across the globe; covers every appellation, official and unofficial, and all the best producers. There is also practical advice on tasting, storing and serving as well as expert tips on choosing food to accompany wine.

An important Web Site

Wine-Searcher <https://www.wine-searcher.com> This a gold mine. Apart from its core function as a database, Wine-Searcher also an encyclopedia which covers the most important grape varieties and wine regions. It also provides daily wine news . Wine-Searcher has mobile apps for iOS and Android. I like the tab “Grapes” it does the following. Type a query into the search box and then learn about any of the world's wine grape varieties and blends (more than 1,000 are covered). Also, the search box can serve a food & wine pairing tool.

The screenshot shows the Wine-Searcher website interface. At the top, there is a dark navigation bar with the logo "wine-searcher" on the left and several menu items: "Discover", "Stores & Producers", "News", "Regions", "Grapes", "Styles", and "Critics". Below the navigation bar is a large banner image of a person pouring wine into a glass. Overlaid on the banner is the text "Find and price wines, beers and spirits across all online stores." Below this is a search bar with the placeholder text "Type any wine name" and a blue search button with a magnifying glass icon. Below the search bar, the text "Discover wines near" is displayed, followed by "Santa Cruz, United States". Below this, there are five wine glass icons representing different types: Red, White, Rose, Sparkling, and Dessert. To the right of these icons is a price slider set to "\$60" and a blue "GO" button.

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Lectures, Field Trips, Exams, Quizzes

Lec	Date	Topics	Assignment
1	June 26	Introduction: Wine as an Academic Subject; Overview of hypotheses, data gathering to classify wine types	CH 18 (p.695 -698,718-719) SC (p. 1-4)
2	28	Types of Grapes Used for Wine & Important Molecules	CH 1 (p.20-49), SC (p. 5-8)
3	July 03	Grape Growing I: The Vineyard Varietal Character, Terroir, AVA	CH 1 p. 5-20, 35), CH 3 (p. 101), CH 4 (p. 118-21, 150, 178, 183), SC (p. 9-12), CH 7 (p. 260), CH (App C)
4	05	Grape Growing II: (1) Vine Cycle Chemical Changes (2) Other Considerations: Canopy Management (SC Mt Vineyard Tour TBA)*	SC (p. 9-12)
5	10	Wine Microorganisms and Fermentation; QUIZ I (THROUGH WINE MICRO)	CH 3 (p. 99), SC (p. 13-16)
6	12	Grape constituents via Fermentation, Role of oxygen	CH 2 (p.68) , CH 3 (p. 100-1), LH #1-3
7	17	Making Table Wines I: White	CH 2 (p. 51-57, 57-62), CH (App A), SC (p.17)
8	19	Making Table Wines II Gen. Winemaking Operations	CH 2 (p. 51-57, 63-78), SC (p. 17-21)
9	24	Making Table Wines III: Craft vs. Technology driven (SC Mt Winery Tour TBA)†	CH 2 (p. 67-69), CH17 (p. 683) CH 4 (p. 169, 172-173)
10	26	Making Table Wines IV: Red	CH 2 (p. 63-67). CH 4 (p. 135-7, 161-2), SC (p. 22-28)
11	31	MIDTERM EXAM (THROUGH WINES II)	
12	Aug 02	Wine and Health	CH 15, SC (p. 39-42)
13	07	The History of Wine, Post Fermentation I	CH 4 (p. 121-129, 143), SC (p. 37-38, 85-86)
14	09	Post Fermentation II	CH 2 (p. 68-74), LH #4
15	14	Making Table Wines V: Rose & Sparkling Wines	CH 3 (p. 67, 78-85), CH 7 (p. 277-8, 282-7), SC (p. 29-34)
16	16	Old World Wines I: French Wines	CH 7 (p. 255-257, 261, 278, 288, 299, 301, 312, 321, 332, 349), SC (p. 43-53)
17	21	Old World Wines II: Other Important areas, Italy QUIZ II (THROUGH OLD I)	CH 8 (p. 368, 370), SC (p. 54-57)
18	23	New World Wines I: California and the United States	CH 4 (p 119 -183, CH 5 (p. 185, 194-198, 205), CH (App C), TC (p. 75-85)
19	28	Sensory Evaluation of Wines, Special Field Trip‡	CH 3, CH 14 (p. 555-563), CH 15 (p. 670-1), CH (App B) LH #5, TC (p. 87-90)
20	30	New World Wines II: Southern Hemisphere	CH 6 (p. 207-8, 230, 232, 240, 244, 249), SC (p. 67-74)
	TBA	FINAL EXAMINATION	

Assignment codes: *CH = pages text by Kolpan; and SC = sections from UCD VEN 3 Reader

*Field trip to SC Mt..Vineyard † Field trip to a SC Mt Winery ‡Special field trip TBA.

Notes: • Required texts [#1] S. Kolpan, B.H. Smith, M.A. Weiss, " Exploring wine" 3e (2010): Wiley ISBN: 978-0-471-77063-3; [#2] Repro Reader C.P. Meredith, A.L..Waterhouse, D.O. Adams , "Introduction to Winemaking" •The class web site at Log in at canvas.ucsc.edu • Important strategies for success in this course include attending each lecture session, attending office hours, and keeping up with the reading. • Plan to spend 10 or more hours studying each lecture topic and pondering the principles. • Participation in the field trips. • Students with disabilities that interfere with learning should on a confidential basis alert the course staff. [Revised 6/5/2018]