

# FDSCTE 2410 Brewing Science

---

## **Instructor:**

Brian Waters, Ph.D

[waters.200@osu.edu](mailto:waters.200@osu.edu)

Office phone: 614-688-5728

Office: 214A Howlett Hall

Office hours by appointment, in person or by video conference

## **Class location/Time and Credit Hours:**

**Class location:** 164 Howlett

**Class time:** Wednesday and Friday, 3:00– 3:55

**Credit hours and work expectations:** This is a 2-credit-hour course. According to [Ohio State policy](#), students should expect around 2 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

## **Prerequisites:**

Biology 1101 (101) or 1113 (113), and Chem 1110 (101) or 1210 (121)

## **Textbooks/Readings**

There is no required text for this course.

## **Additional Required Materials:**

No materials are required, but if you wish to participate in tastings, you will need to purchase your own beverages to complete the tastings.

## **Course Objective:**

To understand the scientific principles of brewing as related to modern beer production.

## **Learning Outcomes:**

At the end of this course, students should be able to:

- 1) Explain the characteristics and function of the four major components of beer – yeast, water, malt and hops
- 2) Describe the chemical reactions that occur throughout the brewing process including ethanol production and flavor development
- 3) Describe the processing steps and their function for beer production
- 4) Contrast the variety of beer styles and be able to explain the combination of raw materials and process practices that make each unique
- 5) Describe beer quality parameters and be able to identify defects and their source.

# FDSCTE 2410 Brewing Science

---

## **Course technology:**

For help with your password, university e-mail, [Carmen](#), or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- Self-Service and Chat support: <http://ocio.osu.edu/selfservice>
- Phone: 614-688-HELP (4357)
- Email: [8help@osu.edu](mailto:8help@osu.edu)
- TDD: 614-688-8743

## Baseline technical skills

- Basic computer and web-browsing skills
- Navigating Carmen: for questions about specific functionality, see the [Canvas Student Guide](#).

## Technology skills necessary for this specific course

- Ability to take and insert digital pictures into a document OR
- Recording, editing, and uploading video

## Required equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested; or other digital camera

## Required software

- [Microsoft Office 365](#): All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Full instructions for downloading and installation is found <https://ocio.osu.edu/kb04733>.

## **Carmen Access:**

You will need to use [BuckeyePass](#) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:

- Register multiple devices in case something happens to your primary device. Visit the [BuckeyePass - Adding a Device](#) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click "Enter a Passcode" and then click the "Text me new codes" button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the [Duo Mobile application](#) to all of your registered devices for the ability to generate onetime codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and the IT support staff will work out a solution with you.

# FDSCTE 2410 Brewing Science

**Grading Scheme:** Your grade will be determined by quizzes, exams and activities. *The maximum number of points that can be earned in this class is 330.* The OSU standard scale (shown below) for percentages will be used.

Scale:

| A       | A-     | B+     | B      | B-     | C+     |
|---------|--------|--------|--------|--------|--------|
| 93-100% | 90-92% | 87-89% | 83-86% | 80-82% | 77-79% |

| C      | C-     | D+     | D      | E           |
|--------|--------|--------|--------|-------------|
| 73-76% | 70-72% | 67-69% | 63-66% | 62% or less |

## Activities:

There are a total of 7 activities in this class. The activities are designed to give you a more “hands-on” experience with several different aspects of the brewing process. Each activity will count 15 points, for a total of 105 points for all activities.

## Exams:

There will be a total of 3 midterm exams and one final exam. The midterm exams are worth 50 points each, and the final exam is worth 75 points. The final exam will be cumulative in nature.

## Bonus Quizzes, Activities, and Discussions:

Occasionally, bonus opportunities will become available. These opportunities can take the form of quizzes, activities, or discussions. These opportunities are only available for a limited time, so make sure you take advantage of them when they are announced.

## Instructor Late Policy and File Format Policy:

Make sure you complete the above activities by the dates listed in the Course Outline below. **Late submissions will be docked 25% each day that they are late.** The only valid excuses for late work are medical emergencies and family deaths. You should not wait until the last minute to get your work done, and this is especially true with activities. Typically, many people wait to submit their work shortly before the due date. There may be issues with your submission if you decide to upload after 5 pm on the due date, as site traffic is usually high. Remember that computer issues (and submission issues count as computer issues) are not valid excuses for late work!

It is very important that your work is submitted in a format that can be read. Often, different versions of a word processing program will cause your work to appear different to me. The best formats for readability are portable document format (.pdf) and rich text format (.rtf). Word documents (.doc and .docx) are good as well. Any Mac-specific file formats like .PAGES should be avoided altogether, as they often are difficult to open. Any submission that cannot be opened on my end must be corrected by you ASAP.

## Course Policies:

**Faculty feedback and response time:** I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call 614-688-HELP at any time if you have a technical problem.)

- Grading and feedback: For assignments, you can generally expect feedback within 5 days.
- E-mail: I will reply to e-mails within 24 hours on school days.

**Attendance policy:** Because this is a distance-education course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- Logging in: Since this course is designed to allow you to go at your own pace, there is not a requirement for you to log in on a regular basis. There are deadlines throughout to prevent you from trying to complete the course in the last week, but it is entirely possible to complete the course very early in the semester.

# FDSCTE 2410 Brewing Science

---

- Office hours and live sessions: OPTIONAL OR FLEXIBLE

If you would like to discuss an assignment with me, or feel that you need to talk to me in person rather than email, please contact me initially by email so that we can schedule a mutually amenable time to meet on campus or by Zoom.

**Discussion and communication guidelines:** The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- Writing style: You should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics. Also, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.). Finally, consider composing your work in a word processor, where you can save your work, and then copying into the Carmen discussion.
- Email etiquette: Professional relationships should be maintained when using e-mail for a class. Below I have included guidelines from Bloomsbury's guide on email etiquette that you should follow when drafting your e-mail. I will not respond to e-mails that I consider inappropriate. I will respond to appropriate emails in a timely manner, do not expect an immediate reply. If you require an immediate response, consider visiting with me in person.

## DO

- Include a descriptive statement in the subject line.
- Use proper salutations when beginning an e-mail.
- Be concise in the body of the e-mail, use complete sentences and proper grammar.
- Use an appropriate closure at the end of each e-mail followed by your first and last name.
- If replying to an e-mail, reference the original e-mail and its content.
- Be selective of your choice of words. Emotions are difficult to convey in text and without the benefit of facial expressions your sentiment can be lost in the words you choose to write.

## DON'T

- Use all capital letters; this conveys a tone of ANGER.
- Use e-mail as a format to criticize other individuals.
- Ask for your grade via e-mail. Grades will not be discussed by e-mail. If you need to discuss a graded item, make an appointment to do so in my office.
- E-mail to inquire when grades will be posted. We will work toward submitting grades promptly, however, recognize that grading assignments and exams requires considerable time to ensure uniformity and fairness.
- Send an e-mail out of frustration or anger. Learn to save the e-mail as a draft and review at a later time when emotions are not directing the content.

## Written assignments:

Your written assignments portions should be your own original work. In assignments, you should follow any standard format style like MLA or APA style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.

## Reusing past work:

In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.

## Falsifying research or results:

All research/activities you will conduct in this course is intended to be a learning experience; you should never feel

# FDSCTE 2410 Brewing Science

---

tempted to make your results or your library research look more successful than it was.

## Group projects

There are no group projects in this course. However, if you are taking this course with a friend, you are welcome to work together on the activities. You each must submit your own pictures and written work.

## University Policies:

**Academic Misconduct:** It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct at <http://studentconduct.osu.edu>

**Ohio State's academic integrity policy:** Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

**If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct.** If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- The Committee on Academic Misconduct web pages ([COAM Home](#))
- Ten Suggestions for Preserving Academic Integrity ([Ten Suggestions](#))
- Eight Cardinal Rules of Academic Integrity ([www.northwestern.edu/uacc/8cards.htm](http://www.northwestern.edu/uacc/8cards.htm))

**Copyright disclaimer:** The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Intellectual Property (covered by copyright) includes Course materials (Text, Audio, Video, Multimedia, Sims, Apps, etc.), and Student Generated materials

# FDSCTE 2410 Brewing Science

---

## **Disability Services:**

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: [slds@osu.edu](mailto:slds@osu.edu) ; 614-292- 3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

## **Creating an environment free from harassment, discrimination, and sexual misconduct**

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at [equity.osu.edu](http://equity.osu.edu),
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or Email [equity@osu.edu](mailto:equity@osu.edu)

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

This course adheres to The Principles of Community adopted by the College of Food, Agricultural, and Environmental Sciences. These principles are located on the Carmen site for this course; and can also be found at <https://go.osu.edu/principlesofcommunity> . For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (<https://equityandinclusion.cfaes.ohio-state.edu/> ). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) at <https://studentlife.osu.edu/bias/report-a-bias-incident.aspx>

## **Requesting accommodations**

If you would like to request academic accommodations based on the impact of a disability qualified under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, contact your instructor privately as soon as possible to discuss your specific needs. Discussions are confidential. In addition to contacting the instructor, please contact the Student Life Disability Services at 614-292- 3307 or [ods@osu.edu](mailto:ods@osu.edu) to register for services and/or to coordinate any accommodations you might need in your courses at The Ohio State University. Go to <http://ods.osu.edu> for more information.

# FDSCTE 2410 Brewing Science

---

## Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools
- [Definition OSU](#)
- [Overview of Accessibility at OSU](#)
  - [Adobe Connect \(Carmen Connect\) Accessibility Adobe Privacy Policy](#)
  - [MediaSite Accessibility Statement](#)
  - [Microsoft Office Accessibility Microsoft Office 365 Privacy](#)

## UNIVERSITY RESOURCES

**Counseling and Consultation Services:** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

David Wirt, [wirt.9@osu.edu](mailto:wirt.9@osu.edu), is the CFAES embedded mental health counselor. He is available for new consultations and to establish routine care. To schedule with David, please call 614-292-5766. Students should mention their affiliation with CFAES when setting up a phone screening.

**Grievances:** According to University Policies, if you have a problem with this class, you should seek to resolve the grievance concerning a grade or academic practice by speaking first with the instructor or professor. Then, if necessary, take your case to the department chairperson, college dean or associate dean, and to the provost, in that order. Specific procedures are outlined in Faculty Rule 3335-7-23. Grievances against graduate, research, and teaching assistants should be submitted first to the supervising instructor, then to the chairperson of the assistant's department.

**Trigger Warning:** This course discusses alcoholic beverages, which could be a potential source of distress for many. If you encounter an issue, please take care of yourself while watching/reading this material (take a break, debriefing with a friend, contacting a Sexual Violence Support Coordinator at 614-292-1111, or Counseling and Consultation Services at 614-292-5766, and contacting me if needed).

**University Escort Service:** A safe ride is a service provided to university students who would like safe transportation across campus. Any university student, faculty, or staff member may request a safe ride. Hours: 7pm to 3am; phone: 614-292-3322.

## Off Campus Field Experiences

You do not need to be on campus for this course, nor is it required that you leave campus for this course. However, you may choose to go somewhere to complete the actions required of the assignments.

# FDSCTE 2410 Brewing Science

---

*The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.*

# FDSCTE 2410 Brewing Science

## Course Summary Outline and Due Dates:

| Date | Topic                                      | Activity/Exam             |
|------|--|---------------------------|
| 1/13 | Introduction to Brewing                    |                           |
| 1/15 | Water: Brewing and Waste                   |                           |
| 1/19 | Malt                                       |                           |
| 1/22 | Hops                                       |                           |
| 1/27 |  | Malt Exploration          |
| 1/29 |  | Hop Cultivar Exploration  |
| 2/3  | Yeast                                      |                           |
| 2/5  | Midterm #1 Review                          |                           |
| 2/10 |  | <b>Midterm #1</b>         |
| 2/12 | Wort Production: Mashing and Lautering     |                           |
| 2/17 | Wort Production: Mashing and Lautering     |                           |
| 2/19 |  | Crafting a Grain Bill     |
| 2/26 | Brewing, Whirlpooling, and Cooling         |                           |
| 3/3  |  | Hop Calculations          |
| 3/5  | Fermentation                               |                           |
| 3/10 |  | Fermentation Calculations |
| 3/12 | Maturation, Clarification, and Carbonation |                           |
| 3/17 | Midterm #2 Review                          |                           |
| 3/19 |  | <b>Midterm #2</b>         |
| 3/24 | Packaging                                  |                           |
| 3/26 | Beer Styles                                |                           |
| 4/2  | Beer Styles                                |                           |
| 4/7  |  | Crafting Lagers and Ales  |
| 4/9  | Midterm #3 Review                          |                           |
| 4/14 |  | <b>Midterm #3</b>         |
| 4/16 | Quality and Sensory                        |                           |
| 4/21 | Quality and Sensory                        | Judging Beer Quality      |
| 4/23 | Final Exam Review                          |                           |
| 4/27 |  | <b>Final Exam</b>         |

\* All due dates and times are in EST (i.e. the Eastern US time zone)