SYLLABUS: FDSCTE 5750
BREWING SCIENCE CAPSTONE
SPRING 2022 (3 CREDITS)

Course overview

Instructor
Instructor: Luis E. Rodriguez-Saona
Department: Food Science and Technology Department
Email address: rodriguez-saona.1@osu.edu
Phone number: 614-292-3339 (office)
Office Location: Parker FST Building Rm 325
Office hours: “Open-door” policy or hours by appointment. A message to my OSU email address is the preferred method of communication; students should indicate the course number in the Subject line to make sure I see the message. Email to schedule an appointment.

Course Organization
Meeting Times and credits: Two lectures meetings of 55 min with specific days of week and times of day TBD, 3 credits
Laboratory times: One 2-hour lab session per week, specific days of week and times of day TBD
Prerequisites/co-requisites/exclusions: MICROBIO 4000; OR permission of instructor; OR Grad standing.

Course description
This course uses the biological and chemical principles of brewing to understand aspects of malting, mashing, fermentation, and the making of different beer styles that is complemented by laboratory exercises to investigate flavors, aromas, brewing methods, and techniques. Hands-on experiments will follow the brewing process from “malting grains to glass”.

Course materials
Required Textbook

Recommended reference materials
• Methods of analysis of the American Society of Brewing Chemists / prepared by the technical committee and the editorial committee of the ASBC. American Society of Brewing Chemists. 8th rev. ed. St. Paul, Minn. 1992.

**Internet resources**

• Carmen - [https://carmen.osu.edu/](https://carmen.osu.edu/) *(Check daily; all materials will be uploaded here)*

**Supplemental materials**

• Additional readings are drawn from a variety of sources and will be posted on the Carmen course site.

**Other Requirements**

An optional element of this course is sensory testing of brewed products. However, for taste testing of alcoholic drinks, students will be required to provide a government issued identification or official document declaring they are at least 21 years of age.

**Course technology**

For help with your password, university email, 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](https://ocio.osu.edu/help/hours), and support for urgent issues is available 24/7.

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

**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 can be found at [go.osu.edu/office365help](http://go.osu.edu/office365help).

**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.
• Download the Duo Mobile application to all of your registered devices for the ability to generate one-time 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.

Course objectives and learning goals

Upon completion of the course, students will be able to:

Objective 1: Develop a science foundation in beer fermentation.

• Learning goal: Develop knowledge of core concepts involved in the complex process of alcoholic fermentation in beer brewing. Allow students to gain an understanding of the fermentation process, factors that impact this process, the technical methods needed to measure its efficacy and challenges in the production process.

Objective 2: Provide a broad perspective of beer and the brewing industry.

• Learning Goals: Develop an appreciation for the range of beer recipes and their sensory characteristics of traditional brewing styles.

Objective 3: Gain experience in the brewing process from malting grains to glass.

• Learning goals: Evoke problem-solving skills by using a hands-on approach fostering teamwork to create a tangible finished product. Demonstrate oral and written communication skills for sharing scientific ideas.

Objective 4: Address environmental challenges towards a sustainable industry.

• Learning goals: Encourage creative strategies and solutions that leverage the growing innovations and advancements in technologies towards sustainable practices that benefit the environment as well as the business.

By integrating class lectures, discussion activities, readings, assignments and class activities, students will achieve a comprehensive learning experience.

Evaluation Criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Term-project report</td>
<td>50%</td>
</tr>
<tr>
<td>Oral presentation</td>
<td>15%</td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
Quizzes- Announced quizzes will be given periodically throughout the semester to test your knowledge on skills and design concepts.

Group Term-Project Report: The term-project paper should start with a cover page that has the title of the project, the student’s names, email addresses, and department. In 250 words or less, provide an abstract describing your project. On the second page and thereafter, the project description should contain following components: 1) introduction that clearly introduces the topic of the project. Outline the goals and objectives of the project; 2) methods that describe the approach and study design. The methods should be described in detail or with sufficient references; (3) The findings and arguments of the work should be described and illustrated. Supporting figures, tables and images of the results should be included; (4) the significance of your study should be presented including the major conclusions inferred from the results, implications of the work, and recommendations; (5) references. The term-project should be no longer than 6 pages, not including references. Students can select their own groups (3 or 4 students) or will be assigned by the instructor. Assessment rubric and additional details will be provided in the Carmen site for the course.

Group Oral Presentation: The grade on the presentation is based upon demonstrating understanding about the project outcomes, critical and logical thinking, answering questions, and effective presentation skills. PowerPoint slides are required for 15 min presentation + 5 min Q & A. Each person in the team should contribute equally if the work is done by a team and each one’s role in contributing to the project should be mentioned during the presentation. The group oral presentation will be given by the SAME group members that participated in the group term project report. Only one submission for the group shall be uploaded in Carmen. There will be an opportunity for group members to rate each other’s contributions.

Participation: This course requires engagement from the students with the topics at hand. Each student will be individually assessed on how they engage throughout the semester in discussion by providing their opinions, bringing in contextually appropriate comments and examples, and supporting the learning environment by asking questions of their peers and guest speakers.

Grading scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93 and above</td>
</tr>
<tr>
<td>A-</td>
<td>90 – 92.9</td>
</tr>
<tr>
<td>B+</td>
<td>87 – 89.9</td>
</tr>
<tr>
<td>B</td>
<td>83 – 86.9</td>
</tr>
<tr>
<td>B-</td>
<td>80 – 82.9</td>
</tr>
<tr>
<td>C+</td>
<td>77 – 79.9</td>
</tr>
<tr>
<td>C</td>
<td>73 – 76.9</td>
</tr>
<tr>
<td>C-</td>
<td>70 – 72.9</td>
</tr>
<tr>
<td>D+</td>
<td>67 – 69.9</td>
</tr>
<tr>
<td>D</td>
<td>60 – 66.9</td>
</tr>
<tr>
<td>E</td>
<td>Below 60</td>
</tr>
</tbody>
</table>
Grading

Undergraduate and graduate students will be held to the same standards and expectations in this course.

Course schedule

Lecture Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
<th>Lab Experiments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Brewing</td>
<td>Introduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Properties of Beer</td>
</tr>
<tr>
<td>2</td>
<td>Sugars and Enzymes</td>
<td>Starch digestion by amylase</td>
</tr>
<tr>
<td>3</td>
<td>Ingredients used in brewing - Origins of Flavor</td>
<td>Sensory quality analysis</td>
</tr>
<tr>
<td></td>
<td>Beer Styles and Decisions</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Malts and Grains</td>
<td>Calculation of Beer Recipes, Grain sampling and inspection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Start of “brew project” - planning</td>
</tr>
<tr>
<td>5</td>
<td>Hops &amp; Malting</td>
<td>α-acid extraction from hops and UV/Vis spectroscopy</td>
</tr>
<tr>
<td>7</td>
<td>Mashing and Brewing</td>
<td>Brew Project</td>
</tr>
<tr>
<td>8</td>
<td>Yeast Introduction</td>
<td>Wort Production &amp; Test Fermentation</td>
</tr>
<tr>
<td>9</td>
<td>Fermentation process</td>
<td>Evaluation of fermentation &amp; wort</td>
</tr>
<tr>
<td>10</td>
<td>Brewing Unit Operations</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Packaging</td>
<td>Evaluation and packaging of Brew Project</td>
</tr>
<tr>
<td>12</td>
<td>Sensory Analysis</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Quality Analysis &amp; Quality Control</td>
<td>Beer Judging!</td>
</tr>
<tr>
<td>14</td>
<td>Troubleshooting</td>
<td>Project Presentations</td>
</tr>
</tbody>
</table>

COURSE POLICIES

Attendance

Attendance is encouraged and will be tracked electronically in Canvas through roll calls at the beginning of each class period throughout the semester. Everyone is expected to participate if you wish to succeed in the course. Make sure you are logging into the course in Carmen. If you have a situation that might cause you to miss an entire week of class, discuss it with me as soon as possible.
Make-up Work

If you miss an examination for a documented medical issue or illness, a death in the family, participation in a documented University sanctioned event, or any other valid excuse, you need to coordinate with the instructor. Excuses for missing an exam must be presented to the instructors prior to the exam when at all possible. Students who will be participating in University sanctioned events must provide the instructor with a copy of the scheduled events and the classes that will be missed. This documentation must be signed by the coach/supervisor and given to the instructor two weeks prior to the event.

Communication

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 Laboratory reports and exams, you can generally expect feedback within 7 days.

- **Email:** I will reply to emails within **24 hours on days when class is in session at the university.** This is the best way to reach me.

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 write using good grammar, spelling, and punctuation.

- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably.

- **Backing up your work:** Compose your academic material in a word processor, where you can save your work. Save your final version as pdf and place it into the Carmen drop box for assignment submission.

Late Assignments

To receive full credit, work must be turned-in on time and in condition to be evaluated. Late assignments will incur a deduction of 10% of the total point value for each 24-hour period that they are late (including weekends). Late assignments can be turned in for up to 7 days (including weekends) after they are due with the penalty described above. After that students will receive a 0 for the assignment. Excuses for missed or late assignments – even valid ones – will not be accepted more than 7 days after the assignment due date.
Other course policies

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**: While you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility**: Let’s maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm does not always come across online.
- **Citing your sources**: When we have academic discussions, 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.
- **Backing up your work**: Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Academic integrity policy

See Descriptions of major course assignments, above, for my specific guidelines about collaboration and academic integrity in the context of this online class.

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 (studentconduct.osu.edu), 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:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)
- Eight Cardinal Rules of Academic Integrity (go.osu.edu/cardinal-rules)

Copyright for instructional materials

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.

Safe and Healthy Buckeyes

Health and safety requirements: All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (https://safeandhealthy.osu.edu), which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will result in a warning first, and disciplinary actions will be taken for repeated offenses.

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,
2.  Call 614-247-5838 or TTY 614-688-8605,
3.  Or Email 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.

Your mental health
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 Counseling and Consultation Services (CCS) by visiting 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 Prevention Hotline at 1-(800)-273-TALK or at suicidepreventionlifeline.org.

David Wirt, 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.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations
The University strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university’s request process, managed by Student Life Disability Services. 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; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

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.

- Canvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools