



FSST 250: The Science of Italian Food

Course Syllabus

Instructor: Brooke Porter, Ph.D. M.Ed., B.Sc.

Credits: 3

Contact Hours: 45

Prerequisites: None

Class Hours: TBA

Office Hours: TBA

Course Type: Standard Course

Lab Fee: 60 €

Course Description

Students will learn and test basic scientific concepts through the broad lens of food. Scientific concepts will be derived from various scientific fields such as biology, microbiology, and chemistry. Students will examine various processes for preparing and storing food, such as fermentation and preserving, in historical contexts. The course has both a classroom and a lab component. Students will alternate between learning scientific processes in a classroom setting and doing experiments in the didactic kitchen. Improving the sustainability of food production and food systems will be discussed throughout the course. In this course, students will engage with peer-reviewed literature and will analyze and disseminate the results of scientific studies. The overall goal is to learn about the interconnectivity of science, culture and the environment through the exploration of basic food processes. No prior scientific knowledge is necessary for this course.

Learning Outcomes and Assessment Measures

By the end of the course, students will be able to:

Learning Outcomes

- Define basic chemical, biochemical, and microbiological transformations important for food production.
- Apply knowledge of food processes to food science experiments.
- Examine the overlap of chemistry and sustainability in food systems vis-à-vis ingredient substitutions.
- Articulate the historical and cultural contexts for food processes in Italy.
- Engage in experiential learning activities and practice systematic research and ethical scholarship.

Assessment Measures

Course requirements that will be used to assess students' achievement for each learning outcome

- The effects of basic chemical and biochemical principles will be explored in food lab such as: fruit preserves, brewing, and bread making.
- Students will engage with the scientific literature and apply learnings to experimentations in the lab/kitchen.
- Students will compare learn about and experiment with vegan and foraged substitutes in the certain food labs.
- Through comparative learning, students will examine the culture of food in Italy as it relates to other food cultures.

Course Materials

Readings

All assigned readings are in the course reader. This includes articles from various peer-reviewed journals as well as selections from *On Food and Cooking: The Science and Lore of the Kitchen* (Harold McGee), *Food Science, An Ecological Approach* (Sari Edelstein), and *The Oxford Companion to Italian Food* (Gillian Riley).

Other

Students are required to maintain a recipe journal during the semester.

Assessment

Participation	10%
Food Journal	20%
Food Labs	50%
Mid-term Exam	10%
Peer Teaching	10%

Grading

Letter grades for student work are based on the following percentage scale:

Letter Grade Range	Numerical Score Equivalent	Student Performance
A	93% - 100%	Exceptional
A-	90% - 92%	Excellent
B+	87% - 89%	
B	83% - 86%	Superior
B-	80% - 82%	
C+	77% - 79%	
C	73% - 76%	Satisfactory
C-	70% - 72%	
D+	67% - 69%	
D	63% - 66%	Low Pass
D-	60% - 62%	
F	59% or less	Fail (no credit)

Course Requirements

Grades are based on a combination of participation, in-class assessments, service learning, and exams.

Participation (10%)

Class participation grades are based on oral contributions to the collective learning experience of the class. Participation means active engagement in the course: being consistently prepared for class having carefully read the assigned readings, asking questions, responding to questions, listening attentively to others, and offering your own insights and opinions. Some lectures may include pop quizzes.

Food Labs (50%)

Food labs account for a large percentage of the total grade. During some labs, students will be responsible for maintaining the health of their cultures. In addition, there will be a peer teaching exercise. Such assessments serve to reiterate the objectives of the course and are important for the overall development of the students. Students will be provided with a grade following each assessment.

Food Journal (20%)

Students will be required to keep a food journal during the semester. Students must keep accurate notes during the food labs. In addition, students must record progress of their food cultures and variables impacting these cultures. A rubric will be provided during the first class.

Mid-Term Exam (10%)

You will present on and be graded on the health and record keeping of your cultures. No alternative exam dates will be offered.

Peer Teaching (10%)

In lieu of a final exam, students will choose to repeat a previous food lab in a peer teaching exercise. You will also be graded on the health and record keeping of your cultures. This is the only time the exam will be given. No alternative exam dates will be offered.

Additional Course Information

This course involves weekly labs which account for a large percentage of the overall grade. Make up labs will not be offered.

Attendance Policy

Class attendance is **mandatory**. Students are allowed **two “free” absences**, which do not need to be justified. However, it is considered common courtesy to inform the instructor of your absence when possible. **It is the students’ responsibility to keep them in case of real necessity (sickness or any other unforeseen inconvenience that may prevent students from being in class)**. Each additional absence, unless for a very serious reason, will lower the students’ grade by one grade level (i.e., a final grade of a B+ would be lowered to a B).

If students miss class, they are responsible for obtaining class notes from other students and/or for meeting the professor during office hours. It is also the policy of the Institute that any student who has eight or more absences automatically fails the class.

Except in the case of medical emergencies, absences are not accepted when tests are scheduled; tests cannot be made up. **Furthermore, scheduled times and dates indicated for exams, quizzes, oral presentations, food labs and any other graded assignments cannot be changed for any reason.** Even if more sections of the same class are activated, students may only take exams during the scheduled times and dates for the section they are enrolled in.

Academic Integrity

All forms of **cheating** (i.e., copying during exam either from a fellow student or making unauthorized use of notes) and **plagiarism** (i.e., presenting the ideas or words of another person for academic evaluation without acknowledging the source) will be handled according to the Institute Academic Policy, which can be found in the Umbra Institute Academic Policies and Conduct Guidelines.

Classroom Policy

Students are expected to follow the policy of the Institute and demonstrate the appropriate **respect** for the historical premises that the school occupies. Please note that **cell phones** must be turned off before the beginning of each class. **Computers and other electronic devices** cannot be used during class lectures and discussions.

Schedule of Topics, Readings, and Assignments

WEEK 1

	<p><i>Course Introduction.</i></p> <p><u>Readings (in class)</u></p> <p>Edelstein, S. (2013). <i>Food Science: An Ecological Approach</i>. 2nd edition, pp. 4-17 [Food Science Background: Food Systems in Relation to Climate Change].</p>
	<p><i>Lab introduction: Equipment, Cultures and the Garden</i></p> <p><u>Readings</u></p> <p>McGee, H. (2004). <i>On Food and Cooking: The Science and Lore of the Kitchen</i>, pp. 531-534.</p> <p>Marsh, A. J., O’Sullivan, O., Hill, C., Ross, R. P., & Cotter, P. D. (2014). Sequence-based analysis of the bacterial and fungal compositions of multiple kombucha (tea fungus) samples. <i>Food Microbiology</i>, 38, 171-178.</p>

WEEK 2

	<p><i>Oxidation: Primary Fermentation</i></p> <p><u>Readings</u></p> <p>Jayabalan, R., S. Marimuthu, & K. Swaminathan. (2007). Changes in Content of Organic Acids and Tea Polyphenols during Kombucha Tea Fermentation. <i>Food Chemistry</i>, 102, (1), 392–398.</p>
	<p><i>Food lab: Making Fermented Italian Herbal Tea</i></p> <p>Students will choose from a variety of foraged ingredients to create a tea mix. A steeped herbal tea will be used to brew kombucha to begin the primary fermentation.</p>

WEEK 3

	<p><i>Energy and Temperature</i></p> <p>The physical and chemical aspects of food process will be introduced as they relate to gelato. The instructor will also explore the culture of gelato. The final 15 minutes of this lecture will be dedicated to the introduction of secondary fermentation of the kombucha. Students will prep bottles (sterilize) and add seasonal fruits (sugars) to begin the secondary ferment of the kombucha.</p> <p><u>Readings</u></p> <p>Thompson, K., Delores, R., Chambers, H. & Chambers, E. (2009). Sensory Characteristics of Ice Cream Produced in the U.S.A. and Italy. <i>Journal of Sensory Studies</i>, 24, (3), 396–414.</p> <p>Riley, G. (2007). <i>The Oxford Companion to Italian Food</i>, pp. 255-260 [ice cream].</p> <p>McGee, (2004). <i>On Food and Cooking</i>, pp. 39-44 [ice cream; atoms, energy, chemical bonds].</p> <p><i>Mini food lab: Secondary Fermentation (Making Fermented Italian Herbal Tea)</i></p>
	<p><i>External Food lab: Gelato</i></p>

WEEK 4

	<i>Food Lab: Guest Lecture - Bread making</i>
	<p><i>Protein Denaturation</i></p> <p><u>Readings</u></p> <p>Borghi, B., Corbellini, M., Minoia, C., Palumbo, M., Di Fonzo, N., & Perenzin, M. (1997). Effects of Mediterranean Climate on Wheat Bread-Making Quality. <i>European Journal of Agronomy</i>, 6 (3), 145–54.</p> <p>McGee, H. (2004). <i>On Food and Cooking</i>, pp.536-539, 778 [gluten, bread rising, Maillard reactions].</p> <p>Riley, Gillian. <i>The Oxford Companion to Italian Food</i>. Oxford: Oxford University Press, 2007, pp. 65-69 [bread].</p> <p>Edelstein, S. (2013). <i>Food Science: An Ecological Approach</i>. 2nd edition, pp. 373-374 [Going Green with Grains].</p>

WEEK 5

	<p><i>Proteins, Elasticity and Gels</i></p> <p><u>Readings</u></p> <p>McGhee, H. (2004). <i>On Food & Cooking</i>, pp. 296-98</p> <p>Freedman, L., & Francis, F. J. (1984). Effect of Ascorbic Acid on Color of Jellies. <i>Journal of Food Science</i>, 49, (4), 1212–13.</p> <p>Edelstein, S. (2013). <i>Food Science</i>, pp. 336-338 [Going Green with Fruits & Vegetables].</p> <p>Riley, G. (2007). <i>The Oxford Companion to Italian Food</i>, pp. 263 [jam and jelly]</p>
	<i>Food Lab: Jams & Preserves (seasonal fruit)</i>

WEEK 6

	<p><i>Function of fats</i></p> <p><u>Readings</u></p> <p>McGhee, H. (2004). <i>On Food & Cooking</i>, pp. 797-802</p> <p>Edelstein, S. (2013). <i>Food Science</i>, pp. 425-426 [The Dilemma of Using Fat Substitutes].</p>
	<i>Food Lab: Crostata (Italian pastry)</i>

WEEK 7

	<p><i>Oxidation: Ethyl Alcoholic Fermentation</i></p> <p><u>Readings</u></p> <p>Bocquet, L., Sahpaz, S., Hilbert, J. L., Rambaud, C., & Rivière, C. (2018). <i>Humulus Lupulus</i> L., a Very Popular Beer Ingredient and Medicinal Plant: Overview of Its Phytochemistry, Its Bioactivity, and Its Biotechnology. <i>Phytochemistry Reviews</i>, 17 (5), 1047–90.</p> <p>McGee, H. (2004). <i>On Food and Cooking</i>, pp. 739-753 [beer]</p> <p>Riley, G. (2007). <i>The Oxford Companion to Italian Food</i>, pp. 262-263 [wild hops]</p>
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	<i>Food Lab: Beer Primary Ferment</i>
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SEMESTER BREAK

WEEK 8

	<p><i>Oxidation: Alcohol & Secondary Ferments</i></p> <p><u>Readings</u> De Keukeleire, D. (2000). Fundamentals of Beer and Hop Chemistry. <i>Química Nova</i>, 23, (1), 108–12.</p>	
	<i>Food Lab: Beer - the Secondary Ferment</i>	

WEEK 9

	<p><i>Tempering</i></p> <p><u>Readings</u> Tannenbaum, G. (2004). Chocolate: A marvelous natural product of chemistry. <i>Journal of Chemical Education</i>, 81(8), 1131. Riley, G. (2007). <i>The Oxford Companion to Italian Food</i>, pp. 126-128 [chocolate].</p>	
	<i>External Food Lab: Chocolate and dolce at Eurochocolate Laboratory</i>	

WEEK 10

	<p><i>Phase Transitions</i></p> <p><u>Readings</u> McGee, H. (2004). <i>On Food and Cooking</i>, pp. 816-818 [phase transitions] Riley, G. (2007). <i>The Oxford Companion to Italian Food</i>, pp. 529-530 [tomatoes] Shephard, S. (2006). <i>Pickled, Potted, and Canned: How the Art and Science of Food Preserving Changed the World</i>, pp. 226-255.</p>	
	<i>Food Lab: Caramel</i>	

WEEK 11

	<p><i>Oxidation: Lactofermentation</i></p> <p><u>Readings</u> Hurtado, A., Reguant, C., Bordons, A., & Rozès N. (2012). Lactic Acid Bacteria from Fermented Table Olives. <i>Food Microbiology</i>, 31, (1), 1–8. McGee, H. (2004). <i>On Food and Cooking</i>, pp. 291-293 [lactic fermentation], pp. 418-420 [hot chilis]. Riley, G. (2007). <i>The Oxford Companion to Italian Food</i>, pp. 124-126 [chili peppers]; pp. 347-349 [olive oil].</p>	
	<i>Mini Food Lab: Fermented Vegetables/ Hot Sauce Part I</i>	

	<i>Food Lab: Fermented Vegetables/Hot Sauce Part II</i>
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WEEK 12

	<p><i>Enzymatic & Non-Enzymatic Food Browning</i></p> <p><u>Readings</u> Ramírez-Jiménez, A., García-Villanova, B., & Guerra-Hernández, E. (2001). Effect of Toasting Time on the Browning of Sliced Bread. <i>Journal of the Science of Food and Agriculture</i>, 81, (5), 513–18. McGee, H. (2004). <i>On Food and Cooking</i>, pp. 778 [Maillard reactions].</p>
	<i>Food Lab: Bruschetta</i>

WEEK 13

	<i>Peer Teaching</i>
	<i>Peer Teaching</i>

	The Final Exam and Special Academic Events Calendar will be provided later in the semester.
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Bibliography

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- McGee, Harold. *On Food and Cooking: The Science and Lore of the Kitchen*. Revised, Updated edition. New York: Scribner, 2004.
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- Tannenbaum, Ginger. "Chocolate: A Marvelous Natural Product of Chemistry." *Journal of Chemical Education* 81, no. 8 (2005): 1131.
- Thompson, Kelly R., Delores H. Chambers, and Edgar Chambers Iv. "Sensory Characteristics of Ice Cream Produced in the U.S.A. and Italy." *Journal of Sensory Studies* 24, no. 3 (2009): 396–414.