UMBRA INSTITUTE
PERUGIA, ITALY

ENV/FSST/GSCI 250: The Science of Italian Food

Course Syllabus

Fall Semester 2021

Credits: 3
Contact Hours: 45
Prerequisites: None
Class Hours: Monday and Wednesday, 11:45 p.m.-1:15 p.m.
Office Hours: Monday and Wednesday, 9:00 a.m.-10:00 a.m.

Course Type: Standard Course
Lab Fee: € 70.00

Course Description

Using food science as a broad field of study, students will engage with peer-reviewed literature and will analyze and be able to understand and disseminate the results of scientific studies. The overall goal is to learn about the interconnectivity of science, Italian culture, sustainability and the environment through the exploration of basic food processes. Scientific concepts will be derived from various scientific fields such as biology, microbiology, physics, nutrition and chemistry. Students will examine various processes for preparing and storing food, such as fermentation and preserving, in both modern and historical contexts. The course has a weekly classroom and a lab component. Students will alternate between learning scientific theory and processes in a classroom setting and doing applied labs and experiments in the didactic kitchen. 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	**Assessment Measures** **Course requirements that will be used to assess students' achievement for each learning outcome**
Define basic chemical, biochemical, and microbiological transformations important for food production.	The effects of basic chemical and biochemical principles will be explored in food lab such as: fruit preserves, brewing, and bread making. E-learning module
Apply knowledge of food processes to food science experiments.	Students will engage with the scientific literature and apply learnings to experimentations in the lab/kitchen.
Examine the overlap of chemistry and sustainability in food systems vis-á-vis ingredient substitutions.	Students will compare learn about and experiment with vegan and foraged substitutes in the certain food labs.
Articulate the historical and cultural contexts for food processes in Italy.	Through comparative learning, students will examine the culture of food in Italy as it relates to other food cultures.
Engage in experiential learning activities and practice systematic research and ethical scholarship.	Students will engage with the scientific literature and apply learnings to experimentations in the lab/kitchen. Field/foraging exercises

Course Materials
Readings
All assigned readings are on the online platform Moodle. 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%
Online/field exercises	10%
Food Journal	10%
Food Labs	45%
Mid-term Essay	10%
Peer Teaching	15%

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%	Superior
B	83% - 86%	
B-	80% - 82%	
C+	77% - 79%	Satisfactory
C	73% - 76%	
C-	70% - 72%	
D+	67% - 69%	Low Pass
D	63% - 66%	
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 (45%)

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.

Online/Field Exercises (10%)

Students will be required to complete assigned learning materials and exercise that equate to one hour of contact time per week. These may include e-learning modules, additional readings, labs and/or field exercises such as foraging and will be left to the discretion of the professor. Weekly assignments will be introduced each week during the classroom/theory session and be posted to moodle.

Food Journal (10%)

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%)

Students will be asked to write a brief reflective piece using a provided quote. Students will be expected to include lived experiences as well as references to the literature, including sources from the course reader.

Peer Teaching (15%)
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
Absences for Covid-related circumstances: in order to keep the entire Umbra community healthy and to comply with local laws, you may not enter the Umbra premises if you have a temperature of 37.5 °C (99.5 °F) or higher. We also ask students that display strong cold or flu-like symptoms to take proper precautions and not risk spreading any type of illness. Students may attend classes remotely and without academic penalty via Zoom in case of self-isolation or illness during the Fall 2021 semester.

Class attendance (in person or through live connection) 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, 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.

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, 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.

Presence during mandatory field trips is especially important for student performance in class. Missing a mandatory field trip, unless for a very serious reason that is communicated to the professor and Umbra Academic Director in a timely manner, will lower students' final grade by one grade level (i.e., a final grade of a B+ would be lowered to a B).

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.

Note: This course may have one or more meetings in the didactic garden located in Via delle Prome 17.

Schedule of Topics, Readings, and Assignments

WEEK 1

Mon., Sept. 20	*Course Introduction.* Readings (in class) Edelstein, S. (2013). *Food Science: An Ecological Approach*. 2nd edition, pp. 4-19 [Food Science Background: Food Systems in Relation to Climate Change].
Wed., Sept. 22	*Lab introduction: Equipment, Start your Cultures and the Garden* Readings McGee, H. (2004). *On Food and Cooking: The Science and Lore of the Kitchen*, pp. 531-534. 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. *Food Microbiology*, 38, 171-178.

WEEK 2

Mon., Sept. 27	*Oxidation: Primary Fermentation* Readings Jayabalan, R., S. Marimuthu, & K. Swaminathan. (2007). Changes in Content of Organic Acids and Tea Polyphenols during Kombucha Tea Fermentation. *Food Chemistry, 102*, (1), 392–398.
Wed., Sept. 29	*Food lab: Kombucha with Italian herbs* Students will choose from a variety of foraged ingredients to create a tea mix. A steeped herbal *tisana* will be used to brew kombucha to begin the primary fermentation.

WEEK 3

Mon., Oct. 4	*Oxidation: Alcohol* 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. Readings De Keukeleire, D. (2000). Fundamentals of Beer and Hop Chemistry. *Química Nova*, 23, (1), 108–12. Readings Bocquet, L., Sahpaz, S., Hilbert, J. L., Rambaud, C., & Rivière, C. (2018). *Humulus Lupulus* L., a Very Popular Beer Ingredient and Medicinal Plant: Overview of Its Phytochemistry, Its Bioactivity, and Its Biotechnology. *Phytochemistry Reviews* ,*17* (5), 1047–90. McGee, H. (2004). *On Food and Cooking*, pp. 739-753 [beer] Riley, G. (2007). *The Oxford Companion to Italian Food*, pp. 262-263 [wild hops] Videos How Beer Saved the World: https://youtu.be/rmVJelBrBSM **Food Lab: Secondary Kombucha Ferment*

Wed., Oct. 6	*Food Lab: Secondary Fermentation*

WEEK 4

Mon., Oct. 11	*Energy and Temperature* 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. <u>Readings</u> Thompson, K., Delores, R., Chambers, H. & Chambers, E. (2009). Sensory Characteristics of Ice Cream Produced in the U.S.A. and Italy. *Journal of Sensory Studies,* 24, (3), 396–414. Riley, G. (2007). *The Oxford Companion to Italian Food*, pp. 255-260 [ice cream]. McGee, (2004). *On Food and Cooking*, pp. 39-44 [ice cream]; 811-816[atoms, molecules, energy].
Wed., Oct. 13	*Food lab: Gelato*

WEEK 5

Mon., Oct. 18	*Proteins, Elasticity and Gels* <u>Readings</u> McGhee, H. (2004). *On Food & Cooking*, pp. 296-98 Freedman, L., & Francis, F. J. (1984). Effect of Ascorbic Acid on Color of Jellies.*Journal of Food Science,* 49, (4), 1212–13. Edelstein, S. (2013). *Food Science*, pp. 336-338 [Going Green with Fruits & Vegetables]. Riley, G. (2007). *The Oxford Companion to Italian Food*, pp. 263 [jam and jelly]
Wed., Oct. 20	*Food Lab: Jams & Preserves (seasonal fruit)*

SEMESTER BREAK
(Oct. 25-29)
WEEK 6

Mon., Nov. 1	*Function of fats* <u>Readings</u> McGhee, H. (2004). *On Food & Cooking*, pp. 797-802 Edelstein, S. (2013). *Food Science*, pp. 425-426 [The Dilemma of Using Fat Substitutes].
Wed., Nov. 3	*Food Lab: Crostata (Italian pastry)*

WEEK 7

Mon., Nov. 8	*Protein Denaturation* <u>Readings</u> Borghi, B., Corbellini, M., Minoia, C., Palumbo, M., Di Fonzo, N., & Perenzin. M. (1997). Effects of Mediterranean Climate on Wheat Bread-Making Quality. *European Journal of Agronomy*,6 (3), 145–54.

	McGee, H. (2004). *On Food and Cooking*, pp. 521-528 [basic structure of doughs]; 536-539, [gluten, bread rising]. Riley, Gillian. *The Oxford Companion to Italian Food*. Oxford: Oxford University Press, 2007, pp. 65-69 [bread]. Edelstein, S. (2013). *Food Science: An Ecological Approach*. 2nd edition, pp. 336-338 [Going Green with Grains].
Wed., Nov. 10	*Food Lab: Guest Lecture - Bread making*

WEEK 8

Mon., Nov. 15	*Tempering* <u>Readings</u> Tannenbaum, G. (2004). Chocolate: A marvelous natural product of chemistry. *Journal of Chemical Education, 81*(8), 1131. Riley, G. (2007). *The Oxford Companion to Italian Food*, pp. 126-128 [chocolate].
Wed., Nov. 17	*External Food Lab: Chocolate and dolce at Turan Cafè Laboratory*

WEEK 9

Mon., Nov. 22	*Phase Transitions* <u>Readings</u> McGee, H. (2004). *On Food and Cooking*, pp. 816-818 [phase transitions] Riley, G. (2007). *The Oxford Companion to Italian Food*, pp. 529-530 [tomatoes] Shephard, S. (2006). *Pickled, Potted, and Canned: How the Art and Science of Food Preserving Changed the World*, pp. 226-255.
Wed., Nov. 24	*Food Lab: Phase Transitions – Chocolate Salami*

WEEK 10

Mon., Nov. 29	*Peer Teaching*
Wed., Dec. 1	*Peer Teaching*

FINAL EXAM WEEK

Dec. 6-10	The Final Exam and Special Academic Events Calendar will be provided later in the semester.

Bibliography

Bocquet, L., S. Sahpaz, J. L. Hilbert, C. Rambaud, and C. Rivière. "*Humulus Lupulus* L., a Very Popular Beer Ingredient and Medicinal Plant: Overview of Its Phytochemistry, Its Bioactivity, and Its Biotechnology." *Phytochemistry Reviews* 17, no. 5 (October 1, 2018): 1047–90.

Borghi, B., M. Corbellini, C. Minoia, M. Palumbo, N. Di Fonzo, and M. Perenzin. "Effects of Mediterranean Climate on Wheat Bread-Making Quality." *European Journal of Agronomy*6, no. 3 (May 1, 1997): 145–54.

De Keukeleire, Denis. "Fundamentals of Beer and Hop Chemistry." *Química Nova* 23, no. 1 (February 2000): 108–12.

Edelstein, Sari, ed. *Food Science: An Ecological Approach*. 2nd edition. Burlington, MA: Jones & Bartlett Learning, 2013.

Freedman, L., and F. J. Francis. "Effect of Ascorbic Acid on Color of Jellies."*Journal of Food Science*49, no. 4 (1984): 1212–13.

Hurtado, Albert, Cristina Reguant, Albert Bordons, and Nicolas Rozès. "Lactic Acid Bacteria from Fermented Table Olives." *Food Microbiology* 31, no. 1 (August 1, 2012): 1–8.

Jayabalan, R., S. Marimuthu, and K. Swaminathan. "Changes in Content of Organic Acids and Tea Polyphenols during Kombucha Tea Fermentation." *Food Chemistry* 102, no. 1 (2007): 392–398.

Marsh, Alan J., Orla O'Sullivan, Colin Hill, R. Paul Ross, and Paul D. Cotter. "Sequence-Based Analysis of the Bacterial and Fungal Compositions of Multiple Kombucha (Tea Fungus) Samples."*Food Microbiology* 38 (2014): 171–178.

McGee, Harold. *On Food and Cooking: The Science and Lore of the Kitchen* Revised, Updated edition. New York: Scribner, 2004.

Ramírez-Jiménez, Antonio, Belén García-Villanova, and Eduardo Guerra-Hernández. "Effect of Toasting Time on the Browning of Sliced Bread."*Journal of the Science of Food and Agricultur*81, no. 5 (2001): 513–18.

Riley, Gillian. *The Oxford Companion to Italian Food*. Oxford: Oxford University Press, 2007.

Shephard, Sue. *Pickled, Potted, and Canned: How the Art and Science of Food Preserving Changed the World* New York: Simon & Schuster, 2006.

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.