



## **SYLLABUS**

### **CONTEMPORARY ISSUES IN SCIENCE – Bread 101 [Course Numbers]**

**Instructor: Elly Vandegrift**

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**Office Hours: [Hours]**

**Language of Instruction: English**

**UO Credits: 4**

**Contact Hours\*: 40**

**London, England**

### **COURSE DESCRIPTION**

**Contemporary Issues in Science: Bread 101.** Bread is a complex medium, looking nothing like the original seed of grain from which it originates. Yet when we mix a few simple ingredients we are able to induce a transformation that results in an edible, highly nourishing, staple food product crucial for sustenance in many cultures. In Bread 101, you will explore the energy requirements, biomedical and biochemical aspects, and local and sociopolitical context of bread production. You will read and discuss a variety of primary and secondary literature related to wheat production, the microbiological, chemical, and physical processes that transform wheat into bread, the energy cost of this transformation, and cultural implications of bread production in the United Kingdom. There will be several field trips and guest speakers. Course work will include active discussions, short essays, problem sets, recipe analysis, and a presentation.

In Bread 101, you will look beyond a single loaf of bread and consider the broader scientific and sociopolitical context in which that loaf was produced. You will explore several related areas of bread production: energy requirements, biomedical and biochemical aspects, and local and sociopolitical context. The course will be divided into interdisciplinary modules based on chemistry, biology, physics, and cultural studies of bread.

In the first module, you will explore an introduction to wheat and bread. You will understand how wheat is grown, basics of its genetics and domestication. We will attempt to track the energetics of this process, starting from seed germination required to procure edible food sources in the context of food production and ending in slicing a freshly baked loaf. The second module will focus on the historical, local and political context of bread production using London and the United Kingdom as a case study. The third module will center on the biomedical and biochemical aspects of bread production and related global implications of food production.

### **COURSE GOALS**

Students will...

1. Understand how wheat is grown and the basics of its genetics and domestication;
2. Consider the living nature of bread, the microbial dynamics, and gluten formation that transform wheat into bread;
3. Understand the local, historical, and political context of bread production using London as a case study;
4. Explore the cultural significance of bread;
5. Explore the biomedical and biochemical aspects of bread production and digestion; and
6. Understand the global perspective of food production and genetically modified crops.

## COURSE LEARNING OBJECTIVES

Students will be able to...

1. define bread;
2. connect the living elements of bread to the final product;
3. conduct a scientific experiment;
4. identify how the local, historical, and political context of bread applies today;
5. discuss implications of climate change on wheat production and wheat genetics;
6. explain the role of gluten in bread production and current health trends related to gluten;
7. discuss implications of genetically modified crops;
8. cultivate, bake, and discuss sourdough and bread;
9. write about scientists (biography, work, accomplishments, challenges) who are researching topics related to our course;
10. analyze, reflect and write accurately on other's scientific theories;
11. speak and write clearly and analytically using scientific terms correctly;
12. read complicated scientific texts and critically evaluate their arguments and evidence;
13. discuss scientific data rigorously to reach useful and true conclusions;
14. debate about scientific problems, putting your message through effectively and making sure you listen, understand and value others' opinions and data.

## INSTRUCTIONAL METHODOLOGY

As your instructor, my priority is to create a learning environment where you each feel a sense of belonging, are challenged, explore new topics and a new city, and build connections. I am here as your teacher, coach and guide to set each of you up for success in your understanding of the content. Before every excursion, you will learn about the place you are about to visit and decide on an area of focus and study. Later on, at class, you will continue to reflect about different scientific topics. At the end, you will be expected to discuss actively (and respectfully), read (quite a lot) on many different topics, think creatively, solve problems, design and perform experiments, write, make oral presentations, and, above all, participate, enjoy, and eat bread.

**Expectations:** I am committed to maintaining an open, friendly, respectful, and supportive learning environment by being receptive to your needs and concerns and to coach, motivate, inspire, and guide you toward the course objectives. The commitment I ask of you is to give your best effort, participate in group activities, ask questions if information or goals are not clear, respect your fellow students and instructors, and provide feedback to us as the course progresses. While I believe that the classroom is a place of partnership between students and teachers in learning, as your teacher, I am responsible for grading your progress in this course. My job is to be objective in my assessments and to consider both effort and achievement in assigning grades. Grading is necessarily a complex process. By making my values and expectations clear to you, I hope that I am giving you the information you need to do your best in this class.

**Preparation, professionalism, and mutual respect** are all important elements of your participation score. Professional behavior is expected at all times. While in London, students should think of themselves as American Ambassadors. Everything you say and do should reflect well on yourself, America, and the GEO program. Right along with that is respect for the British culture and way of life. We are guests here.

**Inclusiveness** Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities.

**Attendance** While students are here in London to experience the UK, attendance in class is critical. Refer to the attendance policy you received during orientation for more details. No make-up assignments are available for unexcused absences.

**Making connections** You bring a rich experience with you to class. Being engaged in the material we are striving to understand means placing that material into the context of your own experience. An outstanding student will actively make connections between concepts that he or she has learned previously. This can happen in and out of class.

**Positive attitude** Excitement, curiosity, determination, cooperation, discipline, attentiveness, are all components of a positive learning experience.

**Talent** Talents differ for individual students. You may possess exceptional intellect, unusual insight, superior organizational skills, incredible commitment, amazing determination, outstanding perseverance, or originality. Find your talent, let it show, and share it with others.

**Superior performance** Performance is the application of your time and skills in this class. The product of your effort is a pleasure to listen to or read and demonstrates that student care about their work and learning of the material.

## MATERIALS AND RESOURCES

We will use Canvas as the primary location for resources sharing, assignment submission, and communicating about grades.

## EXCURSIONS

Will include bakeries, four mills, museum collections, and important scientific and historical sites related to wheat, genetics, and science as [Kew Royal Botanic Gardens](#), [Alan Turing Institute](#) and [Natural History Museum](#).

## METHOD OF EVALUATION (GRADING)

<b>Formative Assessments</b>	<b>30%</b>
Daily pre-class writing	10%
Weekly excursion reports	10%
Facilitation of class reading	10%
<b>Bread projects</b>	<b>55%</b>
Group Recipe Analysis and Presentation	20%
Sourdough Project (reflection and experiment)	20%
Cultural Reading Paper	15%
<b>Final Reflection</b>	<b>15%</b>

Students will complete **weekly excursion reports** and **daily pre-class writing** based on the readings to tie the content from our class time together with our time on excursions throughout the London and the United Kingdom. Each student will also have responsibility for **facilitating class discussion** on one of the primary literature articles.

For the group **recipe analysis and presentation** students will explore how recipes have changed over time in the context of scientific and social factors and ways in which that impacts instructions, ingredients, and the baking process; learn to describe the final product of a recipe and how it is a result of the ingredients and baking process; learn to provide a brief presentation about the bread baking experience associated with a recipe, even if the bread did not turn out well.

By completing a **cultural reading paper students and presentation** will complete close textual reading of culturally significant texts, integration of scientific knowledge of bread from diverse

sources, development of a thesis, design of an argument to support a thesis, use of citations to support an argument, writing a concise and well-argued essay.

The **sourdough project** will allow student so make observations about the natural world, develop a scientific hypothesis, and work with graphical representations of (hypothetical) data. In so doing students will develop an intuition about the biological and chemical processes involved in sourdough starter fermentation, learning to translate this intuition into an experimental design and a graphical representation of the expected experimental outcome.

At the end of the programme, students will complete a **final reflection** building upon all of the elements they have learned during the course about how scientists engage in their work, the nature of global scientific problems, how scientists undertake their work, and discussion of how they will apply the lessons learned when they return to the next phases of their academic and scientific careers.

## BIBLIOGRAPHY

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## CLASROOM BEHAVIORS

All members of the class (both students and instructor(s) can expect to:

1. **Participate and Contribute:** Students are expected to participate by sharing ideas and contributing to the collective learning environment. This entails preparing, following instructions, and engaging respectfully and thoughtfully with others. Together, we will establish more specific participation guidelines and criteria for contributions.
2. **Expect and Respect Diversity:** All classes at the University of Oregon welcome and respect diverse experiences, perspectives, and approaches. What is not welcome are behaviors or contributions that undermine, demean, or marginalize others based on race, ethnicity, gender, sex, age, sexual orientation, religion, ability, or socioeconomic status. We will value differences and communicate disagreements with respect. We may establish more specific guidelines and protocols to ensure inclusion and equity for all members of our learning community.

3. **Help Everyone Learn:** Our goal is to learn together by learning from one another. As we move forward learning during this challenging time, it is important that we work together and build on our strengths. We are returning with a range of feelings about and comfort with being in person, and this means we need to be patient with each other, identify ways we can assist others, and be open-minded to receiving help and feedback from others. No one should hesitate to contact me to ask for assistance or offer suggestions that might help us learn better.

### **Academic Integrity**

You are expected to do your own work. You are encouraged to discuss ideas with each other and to study together, but don't copy someone else's work and don't allow someone else to copy your work. By submitting an essay or other work, you are certifying that you are the student entitled to log in using a specific set of credentials. Allowing someone else to log in under your name, or logging in under someone else's name, to complete an assignment is a breach of university regulations. All students are expected to conform to the student conduct code (<http://integrity.uoregon.edu/>); students not in compliance will be brought to the attention of the university and risk removal from the program.

### **Accessible Education**

Please let me know within the first week of the term if you need assistance to fully participate in the course. Participation includes access to lectures, web-based information, in-class activities, and exams. The Accessible Education Center (<http://aec.uoregon.edu/>) works with students to provide an instructor notification letter that outlines accommodations and adjustments to class design that will enable better access. Contact the Accessible Education Center for assistance with access or disability-related questions or concerns.

If you are not a student with a documented disability through AEC, but you would like for me to know about class issues that will impact your ability to learn, I encourage you to come visit with during office hours so that we can strategize how you can get the most out of this course.

### **Reporting Obligations**

I am a student-directed employee. For information about my reporting obligations as an employee, please see [Employee Reporting Obligations](#) on the Office of Investigations and Civil Rights Compliance (OICRC) website. Students experiencing any form of prohibited discrimination or harassment, including sex or gender-based violence, may seek information and resources at [safe.uoregon.edu](http://safe.uoregon.edu), [respect.uoregon.edu](http://respect.uoregon.edu), or [investigations.uoregon.edu](http://investigations.uoregon.edu) or contact the non-confidential Title IX office/Office of Civil Rights Compliance (541-346-3123), or Dean of Students offices (541-346-3216), or call the 24-7 hotline 541-346-SAFE for help. I am also a mandatory reporter of child abuse. Please find more information at [Mandatory Reporting of Child Abuse and Neglect](#).

### **Academic Disruption due to Campus Emergency**

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas.

### **Accommodation for Religious Observances**

The university makes reasonable accommodations, upon request, for students who are unable to attend a class for religious obligations or observance reasons, in accordance with the university discrimination policy which says "Any student who, because of religious beliefs, is unable to attend

classes on a particular day shall be excused from attendance requirements and from any examination or other assignment on that day. The student shall make up the examination or other assignment missed because of the absence.” To request accommodations for this course for religious observance, visit the Office of the Registrar's website (<https://registrar.uoregon.edu/calendars/religious-observances>) and complete and submit to the instructor the “Student Religious Accommodation Request” form prior to the end of the second week of the term.

## COURSE OUTLINE

Week	Topic	Readings and Assignments
1	<p><b><u>Module 1 Introduction to Growth, Domestication, Energetics</u></b></p> <p><b>What is bread?</b></p> <ul style="list-style-type: none"> <li>Define “bread” from physical, biological, and cultural perspectives</li> <li>Reflect on the ways that bread plays a role in daily life.</li> </ul> <p><b>Perspectives of bread</b></p> <ul style="list-style-type: none"> <li>Provide an overview of bread history of bread and social context.</li> <li>Develop a common language to talk about bread.</li> </ul> <p><b>Living microbiology</b></p> <ul style="list-style-type: none"> <li>Describe the importance of microbial consortia (as opposed to single strains) in food production;</li> <li>Explain the biology and energetics of microbial metabolisms involved in grain fermentation.</li> <li>Explore the composition and providence of sourdough starters</li> </ul> <p><b>Scientific experimentation</b></p> <ul style="list-style-type: none"> <li>Learn how to formulate a scientific hypothesis and develop an experiment to test it.</li> <li>Explore how public science data can be used to test a hypothesis.</li> <li>Develop the experimental design for testing a hypothesis relating sourdough starter growth and flavor.</li> </ul>	<p>Rubel 2011            Lenzer 2014            Hansel and Gretel            Woo 2017            DuVuyst et al 2009            Pollan            Qur’an            Dun Lab</p> <p>Bread Group 1 recipe analysis and presentation            Daily writing            Weekly excursion report            Sourdough project</p>
2	<p><b><u>Module 2: Historical, Political and Local Context of Bread</u></b></p> <p><b>Local production</b></p> <ul style="list-style-type: none"> <li>Trace the history and current practices of growing wheat.</li> <li>Assess the movement to eat locally produced foods.</li> <li>Translate the health, environmental, economic, and genetic benefits or costs of eating locally (and heirloom) produced wheat.</li> </ul> <p><b>Growing wheat</b></p> <ul style="list-style-type: none"> <li>Diagram the life cycle of wheat plants in an agricultural setting including when wheat is planted, how it grows (photosynthesis), and when it is harvested.</li> <li>Identify the parts of a wheat plant.</li> <li>Reflect on climate change will impact wheat production globally.</li> </ul> <p><b>Wheat genetics, history, and green revolution</b></p> <ul style="list-style-type: none"> <li>Identify locations where wheat was domesticated and the resulting genetics.</li> <li>Illustrate how the history of wheat, including genetics and breeding affect yield.</li> <li>Summarize key feature of wheat genetics that lead to variability in crop production.</li> <li>Identify ways that gluten contributes to the structure of bread.</li> </ul>	<p>Wilder            Herbek and Lee            Harvey 2016            Cimons 2018            The Economist 2005            Jabr 2015            Philpot 2013</p> <p>Bread Group 2 recipe analysis and presentation            Daily writing            Weekly excursion report            Cultural reading paper</p>
3	<p><b><u>Module 2: Historical, Political and Local Context of Bread</u></b></p>	<p>Collins 2012</p>



	<p><b>Field Trip to local mill</b></p> <ul style="list-style-type: none"> <li>• Explain how wheat is milled.</li> <li>• Assess the mill production within a context of locally produced foods.</li> </ul> <p><b>Field Trip to bakery</b></p> <ul style="list-style-type: none"> <li>• Describe the terroir of wheat and bread.</li> <li>• Compare and contrast the biodiversity of yeast with a bakery: how are “wild” yeast selected, enriched, propagated, and whether variation in these strains account for variation in breads from different bakeries.</li> </ul> <p><b>What bread should you buy?</b></p> <ul style="list-style-type: none"> <li>• Compare bread labels to make informed consumer choices.</li> <li>• Participate in current discussions about whether wheat is nutritious or poisonous and why food anxieties endure in American culture.</li> <li>• Define protein structure and components of gluten.</li> </ul> <p><b>Energetics of wheat</b></p> <ul style="list-style-type: none"> <li>• Explain how agriculture impacts global warming.</li> <li>• Analyze different kinds of wheat used for bread (and other types of food) including nutritional content.</li> </ul>	<p>Applebaum 2016  Reuben and Coultate 2009  Goucher 2017  Van Stappen 2015  Wheat Industry</p> <p>Bread Group 3 recipe analysis and presentation  Daily writing  Weekly excursion report</p>
4	<p><b><u>Module 3 Biomedical and global perspectives</u></b></p> <p><b>All about gluten</b></p> <ul style="list-style-type: none"> <li>• Define protein structure and components of gluten.</li> <li>• Explain why gluten is important in bread.</li> <li>• Solve bread baking dilemmas</li> <li>• Discuss how are crops modified using genetic engineering.</li> </ul> <p><b>Microbiome</b></p> <ul style="list-style-type: none"> <li>• Explain how human microbial communities are studied.</li> <li>• Discuss how human diet is thought to shape human gut microbiome composition.</li> <li>• Explain experiment testing relationship between bread consumption and human gut microbiome composition and discuss the results of this experiment.</li> </ul> <p><b>Gluten sensitivity</b></p> <ul style="list-style-type: none"> <li>• Summarize immune response to gluten – celiac disease – and its many potential complications (e.g. autoimmune disease, bone disease, cancer, diabetes, etc.) – as well as other types of gluten sensitivity and allergy.</li> </ul> <p><b>Tartine Bread Finale</b></p> <ul style="list-style-type: none"> <li>• Bake the Tartine bread with sourdough starter that has been cultivated all term.</li> </ul>	<p>Biesiekierski 2017  Yong 2017  Korem 2017  Specter 2014  Velasquez-Manoff 2013  Kasarda 2013  Pollan 2013</p> <p>Bread Group 4 recipe analysis and presentation  Daily writing  Weekly excursion report  Sourdough project final report and presentation  Final reflection</p>