HC 441H Science Colloquium: “Bread 101”
TR 2:00-3:50pm, Knight Library Proctor 42

Instructor Contacts

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
<th>Office Hours</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elly Vandegrift</td>
<td><a href="mailto:ellyvan@uoregon.edu">ellyvan@uoregon.edu</a></td>
<td>Wednesday 1-2pm</td>
<td>Science Library</td>
</tr>
<tr>
<td>Jennifer Burns Bright</td>
<td><a href="mailto:jlevin@uoregon.edu">jlevin@uoregon.edu</a></td>
<td>Tuesday and Thursday 9:30-11am</td>
<td>313 Villard</td>
</tr>
<tr>
<td>Miriam Deutsch</td>
<td><a href="mailto:miriamd@uoregon.edu">miriamd@uoregon.edu</a></td>
<td>Monday 4-5pm and Friday 3-4pm</td>
<td>275 Willamette</td>
</tr>
<tr>
<td>Judith Eisen</td>
<td><a href="mailto:eisen@uoregon.edu">eisen@uoregon.edu</a></td>
<td>By appointment</td>
<td>315 Heustis</td>
</tr>
<tr>
<td>Karen Guillemin</td>
<td><a href="mailto:kguillem@uoregon.edu">kguillem@uoregon.edu</a></td>
<td>Monday 1-2 PM</td>
<td>249C Klamath</td>
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Course Description

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”, students will explore with a team of faculty from the sciences and humanities the energy requirements, biomedical and biochemical aspects, and local and sociopolitical context of bread production. Students 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. There will be two field trips and two guest speakers. Course work will include active discussions, short essays, problem sets, and a presentation. This syllabus is called tentative because we may modify/update readings as appropriate.

Modules and Learning Objectives

In the first module, students will explore an introduction to wheat and bread. Students will understand how wheat is grown and the basics of its genetics and domestication. We will consider the living nature of bread and the microbial dynamics that transform wheat into bread. By the end of this unit students will be able to:

- Define “bread” from physical, biological, sociopolitical, historical, energetics, and cultural perspectives;
- Explain the biology and energetics of microbial metabolisms involved in grain fermentation;
- Identify the locations where wheat was domesticated and the resulting genetics.
- Diagram the life cycle of wheat plants in an agricultural setting.
- Explore micro to macro scale of bread;
- Reflect on the ways that bread plays a role in daily life.

The second module will focus on the local and political context of bread production using the Willamette Valley as a case study. By the end of this unit students will be able to:

- Trace the history and current practices of growing wheat in the Willamette Valley;
- Describe the terroir of wheat/bread;
- Compare and contrast the biodiversity of yeast within a bakery: how "wild" yeasts are selected, enriched, propagated, and whether variation in these strains account for variation in breads from different bakeries;
- Describe the importance of microbial consortia (as opposed to single strains) in food production;
- Assess the movement to eat locally produced foods;
- Translate the health, environmental, economic, and genetic benefits or costs to eating locally (and heirloom) produced wheat;
- Participate in current debates about whether wheat is nutritious or poisonous, and why food anxieties endure in American culture.
- Illustrate how the history of wheat, including genetics and breeding, affect yield (the "green revolution" of the 1960s and 70s);
- Analyze different kinds of wheat used for bread (and other types of food) including nutritional content;

Please include the course number in the subject for all communications with the faculty.
The third module will center on the biomedical and biochemical aspects of bread production and digestion. By the end of this unit students will be able to
• Argue pros and cons of genetically modified wheat;
• Define gluten and explain why it is important in bread;
• 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.

The fourth module will build on information that students have studied in the previous modules and focus on the sociopolitical context of bread production. By the end of this unit students will be able to
• Provide an overview of history of bread in the West to set the stage for industrialized bread production, discuss the social context of brown and white bread, and discuss the moral valence of purity and commercial additives and adulterants;
• Trace the politics of Domestic Science through wheat: digestion, the American breakfast industry, and education reform;
• Examine bread recipes and advertisements that illustrate early to mid-century politics and gendered labor of Home Economics movements before and during World War II;
• Contextualize and assess the local food movement in the context of American social history and bread commercialization.

In the final module, students will examine the energetics of bread production, starting from seed germination, examining the energy requirements for processing wheat grain into flour, and considering the question of global energy production related to bread production. By the end of this unit students will be able to
• Describe how seeds germinate and plants grow and compare these concepts from biological and energetics perspectives;
• Define energy from physics and nutritional sciences;
• Calculate and compare the various forms of energy involved, energy conversion mechanisms, conversion efficiencies, the difference between converting energy and actually using energy to do some work or carry out an activity, the manifestation of kinetic energy as temperature, the cost of energy in various forms, and the impact of energy consumption;
• Calculate the energy cost of producing one slice of bread, compare this to its energy content (approx. 100 calories).

Students will have an opportunity to read and discuss a variety of primary and secondary literature around bread production. Students should leave the course more scientifically literate and feeling more empowered to understand the social implications; calculate energy requirements for production; understand basic yeast genetics; and be conversant in major historical, political, and ethical questions involving bread in particular and food in general. We will ask students to demonstrate their understanding of the topics through discussions, writings, problem sets, and larger projects.

**Expectations** We are 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 we 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 we believe that the classroom is a place of partnership between students and teachers in learning, as your teachers, we are responsible for grading your progress in this course. Our job is to be objective in our assessments and to consider both effort and achievement in assigning grades. Grading is necessarily a complex process. By making our values and expectations clear to you, we hope that we are giving you the information you need to do your best in this class.
Preparation  An outstanding student will arrive at class having studied (not just read) the assignment. He or she will have identified concepts or details that remain unclear from the reading and have formulated questions to ask during the class time. Preparation also includes creating a schedule for the term that includes time for studying outside of class.

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 the student cares about his or her work and learning of the material.

Professionalism  A scholar takes care with his or her learning and the products of his or her efforts. This extends to all aspects of his or her work, including attention to written and oral directions, proofreading, spelling, turning off cell phones before class, etc. Additionally, students are responsible for completing their own work and plagiarism (submitting someone else’s work and claiming it to be your own) will not be tolerated.

Diversity  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.

Academic Integrity  All students are expected to complete assignments in a manner consistent with academic integrity. Students must produce their own work and properly acknowledge and document all sources (ideas, quotations, paraphrases). Students can find more complete information about the University of Oregon’s Policy on Academic Dishonesty in the University of Oregon Student Handbook.

Students with Disabilities  The University of Oregon is working to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center (formerly Disability Services) in 164 Oregon Hall at (541) 346-1155 or uoaec@uoregon.edu. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course.

Discrimination and Sexual Harassment  The UO is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. Any UO employee who becomes aware that such behavior is occurring has a duty to report that information to their supervisor or the Office of Affirmative Action and Equal Opportunity http://aaeo.uoregon.edu/. The University Health Center and University Counseling and Testing Center http://counseling.uoregon.edu/ can provide assistance and have a greater ability to work confidentially with students.
Readings – other readings may be added as appropriate
Pocket%20K38.pdf
Buehler, Emily, “Bread Science: the Chemistry and Craft of Making Bread”
Oregon Wheat Commission Presentation.

Grading
Grades will be based on the following assessments throughout the term.
15% Blackboard Writing
15% Problem Sets
10% Participation
20% Reading Recipe
15% Presentation
25% Presentation Paper

Blackboard Writing: Blog and Timeline
Using the blog feature on blackboard you will record your reflections on the readings for each class, your personal bread timeline, and observations about your starter using the guidelines below.

Blog: Before each class you should post 1-3 paragraphs on blackboard reflecting on each reading. This is not intended to be a summary. We want to know about the connections that you see to other components of the class, how your personal experiences influence your interpretation of the reading, questions you have about the information presented, or conclusions that the papers help you form about wheat and bread.

Timeline: To put the information we read throughout the term into context, we will ask you to create a timeline (building on the timeline that we look at during the first week from the New York Times Cookbook) where you track important events. You should include information on locations of wheat production and genetic strains, microbiota, where/when different bread is baked, times for various cultural and political studies, and your personal bread timeline.

Problem sets
You will complete two problem (Experimental Design and Energy Calculation) sets that delve more deeply into the quantitative aspects of bread. Instructions for these will be provided on blackboard.

Reading Recipe
With your group, you will bake a bread and analyze the process and context for that particular recipe, then you will write individual papers on your conclusions. Instructions for this will be available on blackboard.

Breads being made by groups:
1. No Knead Bread (NY Times 670) or Old South Buttermilk Biscuits (NY Times 655)
2. Chipati (My Bombay Kitchen) or Challah (NY Times 659) or Injera (Culinaria Eugenius)
3. Earth Bread (Jones 210) or Cornell Bread (NY Times 658)
4. Brown Bread (NY Times 656), Anadama Bread (Jones 208), or Lahoh (Café Liz)
5. Popovers (NY Times 657) or Rice Buns (162 War Time Cookery Book)
**Attendance and Participation**
Even though attendance is not mandatory, we expect nearly perfect attendance. Attendance includes prompt arrival. Class activities are an integral part of this course and many of these activities cannot be made up outside of class time. It is the student’s responsibility to arrange to complete class exercises when possible and to obtain notes and/or supplemental material missed during an absence. Participation includes not only working on activities in class, but also paying attention, asking questions, and coming to class to learn.

**Presentation**
During each unit, a group will present a more in depth look at one of our module themes. For this assignment, the group could choose to present 1) a case study that illustrates the topic of the module; 2) a synthesis of additional scholarly literature on the topic; or 3) a critical evaluation of several relevant scientific research papers related to the topic. Each group will have 20 minutes to present. Detailed instructions will be available on blackboard.

**Paper from presentation**
Each student will complete a 3-4 page paper about the content of the presentation, presented in dialogue with the assigned reading for the unit and placed into a larger global context of themes covered in the course. The paper will be due on the same day as your presentation.

**Schedule—Always a tentative schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Learning Objective</th>
<th>Reading &amp; Homework on blackboard</th>
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<tbody>
<tr>
<td><strong>Module 1 Introduction to Growth, Domestication, Energetics</strong></td>
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<tr>
<td>1</td>
<td>T 4/1</td>
<td>Define “bread” from physical, biological, and cultural perspectives</td>
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<td></td>
<td>R 4/3</td>
<td>Explain the biology and energetics of microbial metabolisms involved in grain fermentation. Explore micro to macro scale of bread.</td>
<td>Pollan Chapter 3 (Section I) Timeline to blog DuVuyst Begin a starter using Tartine instructions</td>
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<td>2</td>
<td>T 4/8</td>
<td>Identify the locations where wheat was domesticated and the resulting genetics. Diagram the life cycle of wheat plants in an agricultural setting.</td>
<td>Herbek and Lee Matsuoka</td>
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<td>R 4/10</td>
<td>Define energy from physics and nutritional sciences</td>
<td>Presentation Group 1: What is bread? Group 4 bread</td>
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<td><strong>Module 2 Local Politics of Wheat and Bread</strong></td>
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<td>3</td>
<td>T 4/15</td>
<td>Trace the history and current practices of growing wheat in the Willamette Valley; Assess the movement to eat locally produced foods; Translate the health, environmental, economic, and genetic benefits or costs to eating locally (and heirloom) produced wheat;</td>
<td>England Oregon Wheat Commission Armstrong Ralph Korsmeyer Bobrow-Strain Chapter 4 Due-homework on experimental design</td>
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<tr>
<td>Date</td>
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<td>4/17</td>
<td>Field Trip to Noisette Bakery</td>
<td>Describe the terroir of wheat/bread; Compare and contrast the biodiversity of yeast within a bakery: how are &quot;wild&quot; yeast selected, enriched, propagated, and whether variation in these strains account for variation in breads from different bakeries;</td>
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<td>Meet at Dad’s Gate for EMX at 1:30pm or at the bakery 200 W Broadway, Eugene, OR 97401</td>
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<td>4/22</td>
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<td>Describe the importance of microbial consortia (as opposed to single strains) in food production;</td>
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<td>4/24</td>
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<td>Illustrate how the history of wheat history including genetics and breeding affect yield (the “green revolution” of the 1960s and 70s); Analyze different kinds of wheat used for bread (and other types of food) including nutritional content</td>
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<td>4/29</td>
<td>Guest Lecture: Steve Jones</td>
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<td>Group 5 bread</td>
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**Module 3 Biomedical and Biochemical Implications of Wheat and Bread**

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<tr>
<th>Date</th>
<th>Activity</th>
<th>Description</th>
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<tbody>
<tr>
<td>5/1</td>
<td>Define gluten and explain why it is important in bread;</td>
<td>Kasarda Bobrow-Strain Chapter 3</td>
</tr>
<tr>
<td>5/6</td>
<td>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. Role of microbiota in gluten sensitivity</td>
<td>Sapone</td>
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<tr>
<td>5/8</td>
<td>Participate in current discussions about whether wheat is nutritious or poisonous, and why food anxieties endure in American culture;</td>
<td>Davis Taubes Jonnalagadda ChooseMyPlate.gov</td>
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<tr>
<td>5/13</td>
<td>Argue pros and cons to genetically modified wheat;</td>
<td>Biotech Wheat</td>
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**Module 4 Social and Cultural History of Wheat and Bread**

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<th>Date</th>
<th>Activity</th>
<th>Description</th>
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<tr>
<td>5/15</td>
<td>Provide an overview of history of bread in the West to set stage for industrialized bread production. Discuss the social context of brown and white bread, and discuss the moral valence of purity and commercial additives and adulterants.</td>
<td>Wilson Goody</td>
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<td>Day</td>
<td>Date</td>
<td>Activity</td>
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<td>8</td>
<td>T 5/20</td>
<td>Trace the politics of Domestic Science through wheat: digestion, the American breakfast industry, and education reform.</td>
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<td>R 5/22</td>
<td><em>Field Trip to Special Collections Oregon Rare Book Initiative: Recipe the Kitchen as Laboratory 1400-2000</em> Examine bread recipes and advertisements that illustrate early to mid-century politics and gendered labor of Home Economics movements before and during World War II.</td>
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<td>9</td>
<td>R 5/27</td>
<td><em>Field Trip to Camas Country Mill</em></td>
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<td>R 5/29</td>
<td>Contextualize and assess the local food movement in the context of American social history and bread commercialization.</td>
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<tr>
<td>10</td>
<td>T 6/3</td>
<td>Calculate and compare the various forms of energy involved, energy conversion mechanisms, conversion efficiencies, the difference between converting energy and actually using energy to do some work or carry out an activity, the manifestation of kinetic energy as temperature, the cost of energy in various forms, and the impact of energy consumption;</td>
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<td>R 6/5</td>
<td>Calculate the energy cost of producing one slice of bread, compare this to its energy content (approx. 100 calories). Summary Local bread discussion</td>
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<tr>
<td>Finals</td>
<td>6/9 1pm</td>
<td>With your group use starter to bake bread using Tartine Recipe</td>
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