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

Instructor Contacts		**Office Hours**	**Location**
Elly Vandegrift	ellyvan@uoregon.edu	Wednesday 1-2pm	Science Library
Jennifer Burns Bright	jlevin@uoregon.edu	Tuesday and Thursday 9:30-11am	313 Villard
Miriam Deutsch	miriamd@uoregon.edu	Monday 4-5pm and Friday 3-4pm	275 Willamette
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Karen Guillemin	kguillem@uoregon.edu	Monday 1-2 PM	249C Klamath

Please include the course number in the subject for all communications with the faculty.

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;

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 considing 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

Amstrong D. Relocalizing Eden. Available from: http://www.mudcitypress.com/mudeden.html

The Australian. 2012 November 29. Scientists Crack Wheat Genome Riddle. Available from: http://www.theaustralian.com.au/news/health-science/scientists-crack-wheat-genome-riddle/story-e6frg8y6-1226526595350

Biltekoff, C. 2013. Eating right in America: the cultural politics of food and health. Durham, NC.: Duke University Press; 208 p.

Biotech Wheat Available from http://www.isaaa.org/resources/publications/pocketk/document/Doc-Pocket%20K38.pdf

Bobrow-Strain, A. 2012. White bread: a social history of the store-bought loaf. Boston, MA.: Beacon Press; 257 p.

Buehler, Emily, "Bread Science: the Chemistry and Craft of Making Bread"

Collins L. 2012 December 3. Letter from Paris: Bread Winner. The New Yorker. 78-85. Available from: http://www.newyorker.com/reporting/2012/12/03/121203fa_fact_collins

Connely A. 2009 November 27. The Science and Magic of Breadmaking. The Guardian. Available from; http://www.guardian.co.uk/science/blog/2009/nov/26/science-breadmaking

Davis W. 2012 January 14. The Gliadin Effect. Wheat Belly. Available from: http://www.wheatbellyblog.com/2012/01/the-gliadin-effect/

De Vuyst L, Vrancken G, Ravyts F, Rimaux T, Weckx S. 2009,. Biodiversity, Ecological Determinants, And Metabolic Exploitation Of Sourdough Microbiota**.** Food Microbiol. 26(7):666-75. doi: 10.1016/j.fm.2009.07.012. Epub 2009 Jul 18. http://www.ncbi.nlm.nih.gov/pubmed/19747599

England EK 2009. Eating Close to Home: A Guide to Local Seasonal Sustenance in the Pacific Northwest. Elkdream Farm Press, Eugene OR.

Goody J. 2013. Industrial food: towards the development of a world cuisine. In: Counihan C. and Van Esterik, P., editors. Routlegde, New York. p 72-90.

Gunthman J. 2013. Fast Food/Organic Food: Reflexive Tastes and the Making of "Yuppie Chow." In: Counihan C. and Van Esterik, P. editors. Routlegde, New York. p 496-509.

Herbek, J, and Lee C. Comprehensive Guide to Wheat Management in Kentucky. Section 2. Growth andDevelopment of Wheat. Available from: http://www.uky.edu/Ag/GrainCrops/ID125Wheat_Management_Kentucky.html

Jones S. 2012. Kicking the Commodity Habit. Gastronomica Fall:74-77.

Jonnalagadda SS, Harnack L, Kiu RH, McKeown N, Seal C, Liu S, and Fahey GC. 2011. Putting the Whole Grain Puzzle Together: Health Benefits Associated with Whole Grains—Summary of American Society for Nutrition 2010 Satellite Symposium. The Journal of Nutrition 141 (5):1011S-1022S.

Kaplan MDG. 2014. Chefs and Microbiologists Break Bread Anew: Top Chefs, Artisanal Food Producers, And Microbiologist Join Forces To Explore New Tastes And Textures. Microbe 9(1):13-17.

Kasarda D. 2013. Can an Increase in Celiac Disease Be Attributed to an Increase in the Gluten content of Wheat as a Consequence of Wheat Breeding? J Agricultural and Food Chemistry 61:1155-1159.

Katz S. 2012. The Art of Fermentation: An In-Depth Exploration of Essential Concepts and Processes from around the World. Chelsea Green Publishing, White River Junction, VT. p 186-191.

Korsmeyer C. 2012. Ethical Gourmandism. In: Kaplan, D.M., editor. The Philosophy Of Food. University of California Press, Berkley, CA p. 87-102.

Matsuoka, Y. 2010. Evolution of Polyploid *Triticum* Wheats Under Cultivation: The Role of Domestication, Natural Hybridization and Allopolyploid Speciation in their Diversification. Plant and Cell Physiology 52(5): 750-764.

McGee, Harold, "Curious Cook," http://www.curiouscook.com/

Nabhan, G.P. 2008. Terroir. Keynote Speech, Common Ground Country Fair, Sept. 21, 2008. Available from: http://www.mofga.org/Publications/MaineOrganicFarmerGardener/Winter20082009/GaryPaulNabhanKeynote/tabid/1009/Default.aspx

Oregon Wheat Commission Presentation.

Philpott, T. 2013. In Which Top Chefs Have Their Minds Blown by Scientists. Mother Jones.

Pollan, M. 2013. Cooked. Penguin Press, New York. p. 205-289.

Reinhart, P. 2011. Whole grain breads. Ten Speed Press, New York

Rubel, W. 2011. Bread a Global History. Reaktto Books.
Sapone A, *et al*. 2012. Spectrum of gluten-related disorders: consensus on new nomenclature and classification. BMC Medicine. 10:13.
Shapiro, L. 1986. Perfection Salad: Women and Cooking at the Turn of the Century. University of California, Press, Berkley, CA. p 181-204.
Sunset Magazine. 2012. Baking with Unusual Wheats.
Sutton, D. 2013. Cooking Skills, the Senses, and Memory: The Fate of Practical Knowledge. In: Counihan C. and Van Esterik, P., editors. Routlegde, New York p 299-319.
Taubes, G, 2007. Good Calories, Bad Calories. Alfred A. Knopf, New York. p 89-99 and p 136-152.
The Economist. 2005. Ears of Plenty.
Wilson, B. 2008. "A Jug of Wine, A Loaf of Bread," Swindled: from Poisoned Candy to Counterfeit Coffee The Dark History of Food Cheats, John Murray Publishers, London.

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

Week	Date	Learning Objective	Reading & Homework on blackboard
Module 1 Introduction to Growth, Domestication, Energetics			
1	T 4/1	Define "bread" from physical, biological, and cultural perspectives	Rubel
	R 4/3	Explain the biology and energetics of microbial metabolisms involved in grain fermentation. Explore micro to macro scale of bread.	Pollan Chapter 3 (Section I) Timeline to blog DuVuyst Begin a starter using Tartine instructions
2	T 4/8	Identify the locations where wheat was domesticated and the resulting genetics. Diagram the life cycle of wheat plants in an agricultural setting.	Herbek and Lee Matsuoka
	R 4/10	Define energy from physics and nutritional sciences	**Presentation Group 1: What is bread?** **Group 4 bread**
Module 2 Local Politics of Wheat and Bread			
3	T 4/15	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;	England Oregon Wheat Commission Armstrong Ralph Korsmeyer Bobrow-Strain Chapter 4 **Due-homework on experimental design**

	R 4/17	*Field Trip to Noisette Bakery* Describe the terroir of wheat/bread; Compare and contrast the biodiversity of yeast within a bakery: how are "wild" yeast selected, enriched, propagated, and whether variation in these strains account for variation in breads from different bakeries;	Pollan (Section II and III) Collins Naban *Meet at Dad's Gate for EMX at 1:30pm or at the bakery 200 W Broadway, Eugene, OR 97401*
4	T 4/22	Describe the importance of microbial consortia (as opposed to single strains) in food production;	Katz Kaplan
	R 4/24	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	Sunset magazine Philpott Economist The Australian **Presentation #2: What is the local and political context of bread?** **Group 5 bread**
5	T 4/29	*Guest Lecture: Steve Jones*	Jones
Module 3 Biomedical and Biochemical Implications of Wheat and Bread			
5	R 5/1	Define gluten and explain why it is important in bread;	Kasarda Bobrow-Strain Chapter 3
6	T 5/6	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	Sapone
	R 5/8	Participate in current discussions about whether wheat is nutritious or poisonous, and why food anxieties endure in American culture;	Davis Taubes Jonnalagadda ChooseMyPlate.gov
7	T 5/13	Argue pros and cons to genetically modified wheat;	Biotech Wheat **Presentation #3: What are the biomedical and biochemical implications of bread?** **Group 1 bread**
Module 4 Social and Cultural History of Wheat and Bread			
7	R 5/15	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.	Wilson Goody

8	T 5/20	Trace the politics of Domestic Science through wheat: digestion, the American breakfast industry, and education reform.	Shapiro Bobrow-Strain Chapter 2
	R 5/22	*Field Trip to Special Collections Oregon Rare Book Initiative: Recipe the Kitchen as Laboratory 1400-2000* 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.	Sutton Biltekoff Chapter 3 **Presentation #4: What are social and cultural implications of bread?** **Group 2 bread**
Module 5 Global Energy Production Related to Wheat and Bread			
9	R 5/27	*Field Trip to Camas Country Mill*	
	R 5/29	Contextualize and assess the local food movement in the context of American social history and bread commercialization.	Guthman Biltekoff Chapter 4
10	T 6/3	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;	Buehler Connely
	R 6/5	Calculate the energy cost of producing one slice of bread, compare this to its energy content (approx. 100 calories).. Summary Local bread discussion	**Presentation #5: What are the global energy production issues of bread?** **Group 3 bread**
Finals	6/9 1pm	**With your group use starter to bake bread using Tartine Recipe**	