# Brewing Science BVG 4350 Spring 2016

Tues & Thurs 11am to 1:50pm HLC Building 102
Course website: http://bonhamchemistry.com

**Instructor: Dr. Andrew J. Bonham** **Office Hours:** TBA
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### What do I expect from you? How can you succeed at this course?

Brewing Science and Chemistry are complex topics, and while I believe that every student can succeed at this course, like any challenge, certain expectations must be met for you to succeed.

- Regular Attendance and Daily Practice: Science, brewing, and math are their own languages, with specialized vocabulary and ways of approaching problems. Just like the study of a foreign language, I expect regular attendance and daily practice. If you cannot commit to thinking about, and solving problems in, chemistry every day, you will not acquire enough skill to confidently pass the exams and master this topic to the level that you will need for future careers.
- Plan for the Future: I expect you to be aware of the lecture schedule and exam dates, and plan accordingly. I expect at least two weeks notification for any quiz you may miss (see Quizzes, below), and there will not be any flexibility on the date and time of the Final Exam. Review the schedule now, and plan for the future.
- Pay Attention and Work Through The Material: It is exceedingly easy to fall into the trap of half-listening to lectures, nodding along with the material, only to find that you cannot answer the test questions. You cannot succeed by listening alone. I expect you to take notes, engage with the class and your classmates, and commit to the often difficult process of learning unfamiliar topics.
- Take the lab work seriously. Labs are designed to reflect, as much as possible, real-world laboratory experiences. This is a great opportunity to learn useful skills, but requires careful attention to safety hazards, details of experiments, and awareness of the lab environment.

### What can you expect from the instructor?

I will give clear, relevant, on-time lectures that encourage class participation. I will provide clear assignments, clear and fair grading policies as outlined in this syllabus, and relevant practice problems. I will offer reasonable availability outside of class (e.g., office hours). Through my actions, I will encourage your understanding and enjoyment of the science of brewing.

### Required Materials:

- The Chemistry of Beer: The Science in the Suds, Barth. Available in the Auraria bookstore.
- Laboratory Manual: Available on the course website.
- Safety glasses in the laboratory will be required at all times. A lab coat or an apron is highly recommended.
- Closed toed shoes are required at all times.
- Scientific Calculator for Quizzes (no cell phones, graphing calculators, laptops, tablet computers, or other web devices).

### Reading:

The course will be primarily based on the textbook and on lecture notes, which will be available online. The textbook is a good, informative read, and reading the suggested chapters will improve your understanding of the material immensely—there is only so much lecture time, and a world of interesting things to learn. Additionally, quizzes will partly be based on that content. If you attend lecture, read the textbook, and participate in lab, you will be well prepared to succeed.

### Class Participation:

Regular attendance and involvement in the classroom learning process is important- particularly in the labs. Your class participation will constitute a 20% participation portion of your grade.

### Quizzes:

Quizzes will be given biweekly. Quizzes are worth 60% of the course grade and will cover the material of the lectures and labs from that section. The quizzes will be given during the first 30 minutes of class. Lecture and lab experiments will follow. At the end of the course, your lowest quiz grade will be dropped (we all have bad days).

### Lab Final Project:

As the final project for this class, you and a partner will design and make a custom beer. Along the way, you will select a style, create a recipe, evaluate and carefully record the brewing process at each stage, and assess the quality of the final product. The final product will be a batch of custom brew, along with a lab report detailing design, recipe, quality, and assessment metrics.

## Grade Calculation & Policies: (tentative and subject to change!)

| | |
|---|---|
| Class Participation | 20 % |
| Lab Quizzes | 60 % |
| Lab Final Project | 20 % |
| Total | 100 % |

Points are tentative and subject to change by the instructor.
The grading scale is as follows: A (90 -100%), B (80 - 89%), C (70 - 79%), D (60 - 69%), F (< 60%)

FERPA policies prohibit me from releasing your grades via phone or email unless you register with the Registrar's office and obtain a non-identifying security code.

## Administrative Syllabus policies

Students are responsible for full knowledge of the provisions and regulations pertaining to all aspects of their attendance at MSU Denver, and should familiarize themselves with the policies found on the following web site:
https://www.msudenver.edu/handbook/academicpoliciesforstudents/

Students should be aware that any kind of withdrawal can have a negative impact on some types of financial aid, including scholarships. For further information, follow this link: http://msudenver.edu/financialaid/undergraduate/keepingawards/

1. **WITHDRAWAL FROM A COURSE** https://www.msudenver.edu/handbook/academicpoliciesforstudents/#Withdrawal

2. **ADMINISTRATIVE WITHDRAWAL**
https://www.msudenver.edu/handbook/academicpoliciesforstudents/#Withdrawal_Due_to_Emergency

3. **INCOMPLETE POLICY** https://www.msudenver.edu/handbook/academicpoliciesforstudents/#Incomplete

4. **ACADEMIC DISHONESTY** https://www.msudenver.edu/deanofstudents/studentconduct/academicintegrity/academicdishonesty/

5. **PROHIBITION ON SEXUAL MISCONDUCT** https://www.msudenver.edu/deanofstudents/studentconduct/sexualmisconducttitleix/

6. **ACCOMMODATIONS TO ASSIST INDIVIDUALS WITH DISABILITIES**
http://www.msudenver.edu/access/faculty/adasyllabusstatement/

7. **CLASS ATTENDANCE ON RELIGIOUS HOLIDAYS**
https://www.msudenver.edu/handbook/academicpoliciesforstudents/#Class_Attendance_Holidays

8. **STUDENT EMAIL POLICY** http://www.msudenver.edu/handbook/generaluniversitypolicies/#Electronic_Communication_Policy

***If you have any difficulty accessing the hyperlinks in this document, please inform the instructor.***

## Syllabus Changes and Policy:

Any changes in this syllabus I may deem necessary during the semester will be announced in class and made available in writing. I reserve the right to revise the syllabus and grading policies at any time.

**BVG 4350 Lecture & Lab Schedule (tentative and subject to change!)** **Spring 2016**

| Week | Dates | Lecture Topics | Reading (Barth) | Lab Experiments |
|---|---|---|---|---|
| 1 | Jan 18 to 22 | • Introduction to Brewing and Water Quality | 1-31 & 69-86 | • Introduction; pH and UV/Vis Spectroscopy<br>• Titration for dissolved metals in water<br>• Properties of a finished beer |
| 2 | Jan 25 to 29 | • Sugars and Enzymes | 113-147 | • Starch digestion by amylase<br>• Enzyme kinetics of amylase |
| 3 | Feb 1 to 5 | • Flavor and Origins of Flavor<br>• Beer Styles and Decisions | 195-223 Flavor handout | • Sensory quality analysis and the flavor wheel<br>• SRM of Beers |
| 4 | Feb 8 to 12 | • Malts and Grains | Malt handout | • Calculation of Beer Recipes<br>• Grain sampling and inspection |
| 5 | Feb 15 to 19 | • Hops | Hops handout | • Alpha acid extraction from hops and UV/Vis spectroscopy |
| 6 | Feb 22 to 26 | • Malting | Malt handout | • Wort Production I<br>• Grain Bills |
| 7 | Feb 29 to Mar 4 | • Mashing and Brewing | 149-159 | • Wort production II |
| 8 | Mar 7 to 11 | • Processing: Hopping, clarification, cooling | Processing handout | • Evaluation of Wort: alpha acid, gravity, UV/Vis, flavor |
| 9 | Mar 14 to 18 | • Review | --- | • Planning for large-scale brewing |
| -- | Mar 21 to 25 | SPRING BREAK | --- | --- |
| 10 | Mar 28 to Apr 1 | • Yeast Introduction | 161-175 | • Wort Production<br>• Test Fermentation |
| 11 | Apr 4 to 8 | • Fermentation and propagation | Fermentation Handout | • Evaluation of fermentation |
| 12 | Apr 11 to 15 | • Processing and Packaging | 241-249 | • Start of "brew project" - planning |
| 13 | Apr 18 to 22 | • Quality Analysis | 177-192 | • Brew Project |
| 14 | Apr 25 to 29 | • Quality Control | 251-263 | • Brew Project |
| 15 | May 2 to 6 | • Broader Impacts | | • Evaluation and packaging of Brew Project |
| FINAL | TBA during May 9 to 13 | **Final Presentation and Report TBA** | | • Beer Judging! |