Course Structure - Molecular Gastronomy

- **Goal**: to promote interest in food and chemistry.
- **Learning components**: reading, guided inquiry worksheets, focused discussion, and concept rich hands-on activities.
- **Book**
  - "The Kitchen as Laboratory", eds. Vega, Ubbink, & van der Linden.
  - A collection of chapters written by chefs with interests in science.
  - The chapters are independent and are content rich but not overly technical.
- **Schedule**
  - First part of semester: alternating weeks
  - Tuesdays: topic focused with reading, worksheets, and discussion
  - Thursdays: activities focused with in class experiments
  - Mid-term out of class project prep-time with extended office hours.
  - Regroup for student presentations (up to 3 per session)
  - Be aware of "time accounting" so that equivalent to 1 s.h. course.

Typical Topic Week

- **Tuesday**
  - Reading assignment (~10-15 pages), plus supplemental web-based resources available on ICON.
  - Students work in small groups on "worksheets" for 20 minutes.
  - Classroom discussion of worksheets with instructor prompted extensional and explanations.
- **Thursday**
  - "Worksheet" given to students to provide a tangible goal for the activity and to communicate high expectations to learning while having fun.
  - Students work on activity about 30 minutes.
  - Instructors highlight key finding along way.
- **Scoring**
  - Worksheet are scored with rubric. (Scores high but not all perfect).

Typical Presentation Week

- Up to 3 presentations in one class
  - Presentation can be either Powerpoint and/or activity.
  - Topic must focus on a connection between food and chemistry and must present experimental evidence (loosely defined).
  - Presentation are peer reviewed and instructor reviewed with points in defined categories. Student comments are anonymous and are returned to presenter after being reviewed by the instructors.

- **Overall Grade**
  - Tuesday participation 40%, Thursday activities 40%, and project presentation 20%. Most grades between A to B+ but lower grade was giving based on low scores that resulted from absenteeism.
Tuesday, Sept. 11

1) “Liquid water becomes solid at 32°F (0 °C). Ice cream is normally consumed at a temperature between 7 and 14°F (-14 and -10 °C). If ice cream consisted only of water, all the water would turn into ice at these temperatures, and the “ice cream” would be very hard and almost impossible to eat. “(textbook, p. 124)
   a) Explain why the water in ice cream is only partially frozen.
   b) At -10°C, what % of the water in ice cream is frozen? (see graph below)

   ![Graph showing temperature vs. water frozen (% of original)]

2) “During the freezing of ice cream, air is mixed in, forming air bubbles. For the air bubbles to stay incorporated inside the mixture, they have to be stabilized (like foam in a cappuccino).” (textbook, p. 127-8) How do air bubbles affect the texture of ice cream? Explain how the air bubbles are stabilized in ice cream.

3) “The unfrozen matrix contains the bulk of the dessert’s ingredients; apart from ice and air….The concentration of these additives will determine the viscosity of the aqueous phase and therefore partly determine the texture of the ice cream.” (textbook, p. 128-130.) What are common ice cream additives and how do they affect the viscosity and/or texture of ice cream?

4) What is liquid nitrogen and what is its boiling temperature? What precautions are required when handling liquid nitrogen?