Collaborative Learning Between Food Chemistry and Mathematics

Cathy Davies*, Louis F Rossi and John A Pelesko
Department of Animal and Food Sciences and Department of Mathematical Sciences

Outcomes and Suggestions

FOSC 328/628 is a required course for Food Science and Technology Majors. This year seven majors registered for this course: 3 undergraduate, 2 grad students, 8 Food Science Majors and 1 US Minor.

Traditionally, Food Chemistry is taught as if it were an extension of organic chemistry. Most textbooks go through the chemistry of food, starting with water, followed by carbohydrates, proteins, lipids, vitamins, food additives, etc.

However, in the food industry, food chemistry knowledge is used to troubleshoot problems. Why has this food gone off in two weeks? Why is this product tasting so bad? Why does this product feel soft? How do changes in the product hold up? If the food chemistry student does not have enough knowledge, the student will not be able to answer these questions. Food Chemistry is an applied branch of science and students would have difficulty in finding a job if they did not know how to troubleshoot problems.

Two different approaches to starch and their connections to the real world. This course focuses on modeling, experimentation, computation and the application of mathematical methods to open problems. Writing and verbal communication of mathematics and science plays a central role in helping students manage their projects.

Previous problems include:
• Optimize the lower surface of an airbearing to minimize lift.
• Understand the interaction between heat and moisture in an array of the ways to be used for a transdermal drug delivery system.
• Develop a mathematical description of the Briggs-Rauscher oscillating chemical reaction.

Math 512 is an evolving course and welcomes input from a variety of students.

Cooking Starch

During the summer of 2004 two undergraduate students worked on this project. One math student, Kathryn Sharpe, was supervised by Dr.’s Ross and Pelesko. She worked in the MEC Lab, which is an experimental laboratory housed in the Department of Mathematical Sciences. One Food Science student, Latonia Polk, was supervised by Dr. Davies. She worked mostly in Dr. Davies Laboratory. The role of these two students was to attempt to start the projects that would be used in the fall. Their job was not to complete these projects, but rather to act as test subjects. Are the experiments reasonably easy to carry out? Are the two-time consuming? Can an undergraduate construct a model of these systems in a reasonable amount of time? In addition, Katy and Latonia were asked to interact – much as the students in Math 512 and FOSC 328/628 would in the fall. By observing their interactions, both the successes and pitfalls, we were better able to plan for team interactions in the fall. Katy and Latonia presented the results of their work at a symposium held by the Department of Mathematical Sciences in mid-August.

Summer Preparation

During the summer of 2004 two undergraduate students worked on this project. One math student, Kathryn Sharpe, was supervised by Dr.’s Ross and Pelesko. She worked in the MEC Lab, which is an experimental laboratory housed in the Department of Mathematical Sciences. One Food Science student, Latonia Polk, was supervised by Dr. Davies. She worked mostly in Dr. Davies Laboratory. The role of these two students was to attempt to start the projects that would be used in the fall. Their job was not to complete these projects, but rather to act as test subjects. Are the experiments reasonably easy to carry out? Are the two-time consuming? Can an undergraduate construct a model of these systems in a reasonable amount of time? In addition, Katy and Latonia were asked to interact – much as the students in Math 512 and FOSC 328/628 would in the fall. By observing their interactions, both the successes and pitfalls, we were better able to plan for team interactions in the fall. Katy and Latonia presented the results of their work at a symposium held by the Department of Mathematical Sciences in mid-August.

Outcomes and Suggestions

• All projects were successfully written up in five reports and presented at both mini-symposia.
• Students didn’t interact as much as we had hoped.
• Students were based at different ends of campus:
  • Math in Memorial Hall & Ewing Hall on Main Campus.
  • FOSC in Townsend Hall on South Campus.
• Conflicting class schedules:
  • Students within one course and between courses.
  • Hard to get together outside of class.
• These might need to be reconsidered next time we teach these classes together.
• First time FOSC students worked on open-end semester long projects.
  • Evaluations suggest that they wanted more lectures.
  • In future: reinforcement of relevance to food chemistry.
  • Progress in FOSC capstone (Spring 05) greatly improved compared to previous years.

References