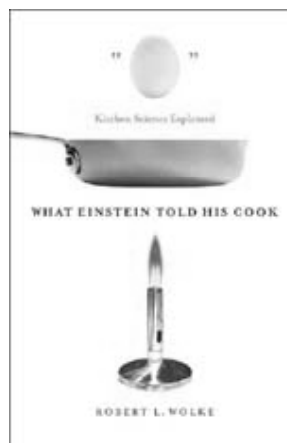


## Chemistry and Cooking: A Course Using Robert Wolke's *What Einstein Told His Cook*

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Slides available at  
[facstaff.bloomu.edu/bwilcox](http://facstaff.bloomu.edu/bwilcox)



Robert L. Wolke, *What Einstein Told His Cook*. W.W. Norton, New York, 2002.  
ISBN 0-393-01186-6



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## The Course

- "Chemistry and the Citizen" Chem 100
  - general education course for non-science majors
  - no prerequisites, not a prereq. for other courses
  - topics/curriculum is instructor's choice
  - typical textbooks:
    - *Chemistry in Context; The Extraordinary Chemistry of Ordinary Things; World of Chemistry; etc.*
  - no lab



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## The Students

- Non-science majors
- Wide range of chemistry background
  - 0 to 2 years high school chemistry
- Previous other science general ed. courses?
- Classes of 50 – 130 students
- My motto: "Any science discussed will be value added for these students."



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## My Theme

- Chemistry and other science in cooking and the household
  - Topics initiated by...
    - *What Einstein Told His Cook*
    - student questions
  - Resources for students
    - *What Einstein Told His Cook*
    - My lectures
    - Web resources



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## My goals for students (spoken and unspoken)

- Better understanding of science around them
- Debunking myths and misconceptions
- Books with "Einstein" in the title are not scary or unfathomable



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## The Book

- Not a text
- Answers questions
  - from *Washington Post* column
- Uses "techspeak" sparingly
- Humor and wry wit

### Wolke Chapters

1. Sweet Talk
2. The Salt of the Earth
3. The Fat of the Land
4. Chemicals in the Kitchen
5. Turf and Surf
6. Fire and Ice
7. Liquid Refreshment
8. Those Mysterious Microwaves
9. Tools and Technology



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## How I Use the Book

- Usually assign reading ahead of time
  - selective
- Supplement technical information

### Wolke Chapters

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## Tools used

- Blackboard™ course management system
  - post course materials
  - students complete assignments
- Student response system (TurningPoint)
  - poll students
  - quizzes



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## Course topics

- Water – cook in it, its in food
  - representations, properties
  - heating and cooling, phase transitions
    - *"Does it take longer to heat a pan of water to boiling or to boil off the water?"*
  - energy transfer
    - top of the stove, pressure cookers, steamers
    - conventional & convection ovens
    - microwave ovens



## Course Topics (continued)

- Popcorn demo
  - Pose the question...
    - "When a bag of microwave popcorn is popped, does gain weight, lose weight or remain the same? Why?"*
  - Do it
  - Explain why.
- Other related topics
  - freezer burn, browning sleeves, microwave defrosting...



## Course Topics (continued)

- Oil and other fats
  - Pose the question...  
*"How do you cook at higher temperatures than the boiling point of water?"*
  - representations and properties
  - triglycerides
  - butter vs. margarine
  - saturated & unsaturated; *cis-* & *trans-*
  - fats gone bad



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## Course Topics (continued)

- emulsifiers
  - mono- & di-glycerides
  - soap & detergents
- lipoproteins and cholesterol
- diacetyl – "artificial" butter flavor



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## Course Topics (continued)

- Sugars and carbohydrates
  - sugars, starches, cellulose
  - sucrose – where it comes from
  - other sugar sweeteners
  - caramelization reactions
  - taste
  - sugar substitutes
  - osmosis



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## Course Topics (continued)

- Water treatment in the home
  - activated charcoal water "filters"
  - water softeners
- Cooling in the kitchen
  - refrigeration
- Common chemicals
  - acids and acidity/basicity
  - baking soda and powder



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## Course Topics (continued)

- vinegar
  - fermentation and distillation
- flavor enhancers
- vanilla
  - extraction processes
- Salt
- Proteins
  - start with eggs – cooking process
  - Malliard reactions



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## Activities and Assignments Examples

- Question submission – about a month into the course
  - through Blackboard
  - Inspired by reading or course.
  - Use as basis for some lectures - "QFC"  
(question from class)
    - extends topic
    - points out misconceptions
    - brings topics together



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## Some QFC's

- My girlfriend made Crème brûlée the other night for dessert. When I asked her what the top of the dish was made out of, she said 'Just caramelized sugar.' How does sugar caramelize?
  - Introduces a topic
- What's the difference between brown sugar getting hard and table sugar getting hard?
  - Allows use of information already discussed
- How come energy drinks like Gatorade don't taste sweet. Shouldn't they be very sweet since sugar is associated with being high in energy?
  - Expands a topic (and causes me to do some research)



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## Activities and Assignments Examples

- "Ingredients" assignment
  - Identify ingredients in several prepared foods that we have talked about
- "Salt Claims" assignment
  - Find websites purporting claims for different types of salt; Do they support the claim with data?



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## What I hope they take from the course

- Books with “Einstein” in the title are not scary or unfathomable
- Read labels with some better understanding
- Ability to annoy their friends and family in the kitchen



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## Other resources I use

- Harold Magee, *On Food and Cooking, The Science and Lore of the Kitchen*, Scribner, New York, 2004.
- Manufacturers websites
- Wikipedia – believe it or not



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