Supporting and Developing a Course to Save the World

9 JAN 2013
MAA Session for MPE-13
JMM, San Diego, CA, USA

Jessica M. Libertini
Department of Mathematics
University of Rhode Island, Kingston, RI

Outline

- Motivation for the course
- Course Content Development
- Course Structure Development
- Final Thoughts

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Eat local!

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Eat local!

Go organic!

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Eat local!

Go organic!

Say no to GMO!

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Eat local!

Go organic!

Say no to GMO!

Go vegan!

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Eat local!

Go organic!

Say no to GMO!

Go vegan!

Corn feeds people not cars!

Motivation

NEWS FLASH
(NPR, WaPo, NYT):
How do we feed 9 billion people by 2050?

Eat local!

Go organic!

Say no to GMO!

Go vegan!

Eat bugs!?

Corn feeds people not cars!

Motivation

- My own personal passion
- National media attention
- Interest at my university
  - Course sponsored by the newly formed Center for Explorations in Mathematics and Science (CEMS)

Motivation

- Enough material to motivate a whole course!
- Non-calculus based math-modeling course
  - Discrete dynamical systems
  - Curve fitting
  - Network science

Motivation

- Enough material to motivate a whole course!
- Non-calculus based math-modeling course
  - Discrete dynamical systems
  - Curve fitting
  - Network science
- Student skills
  - Finding, understanding, and referencing resources
  - Critical thinking and developing sound arguments
  - Oral and written communication skills
  - Team work, ability to see other points of view

Course content development

- Discrete Dynamical Systems
- Curve Fitting / Data Analysis
- Network Science

Course content development

- Discrete Dynamical Systems
- Curve Fitting / Data Analysis
- Network Science

- Motivating questions for exploration (examples)
  - When will we run out of food? Then what?
  - How does mono-cropping deplete the soil, and of the solutions, which is the “best”?
  - Is eating local sustainable and viable for the whole planet’s human population?
  - Is organic farming really better for the earth and can it produce enough to feed EVERYONE?

Course content development

- Resources
  - News / Media (newspapers, magazines, radio, TV, internet) as motivation
  - Government reports for data
  - Lobbyist reports for “spin”
  - Others??? (Students are responsible for finding, using, and documenting all resources)

Course structure development

- How can we cover it all?!
- For first two units:
  - Groups of 6
    - Assigned a topic
    - Given some initial guiding questions & starting resources
    - Develop and tweak a model
  - Divide each group into 2 teams of 3
    - One team takes one stance, one the other (pro/con)
    - Adapt model to support “spin”
    - Debate / presentation for the class and guests
    - Prepare written report

Course structure development

- Final unit:
  - As a class:
    - Discuss food growing / production / distribution networks
  - As individuals:
    - Choose one topic to study in-depth
    - Prepare a written report
    - Prepare a poster
    - Present the poster at a poster session with invited guests from the college and the community

Final Thoughts

- Driving factors combined:
  - Personal passion
  - National/international media interest
  - University interest
- Student development opportunities:
  - Generate mathematical appreciation for non majors
  - Develop mathematical literacy skills
  - Encourage positive collaborative and competitive working relationships with peers
  - Enhance reading, writing, and speaking skills

QUESTIONS?

Want to follow along?
Email me to get additional information including access to the course website!

Jessica M. Libertini
jlibertini @math.uri.edu