



Preparing a BME course

**Michelle Grimm
Kristen Billiar**

SBC2009 Education Workshop
June, 19 2009



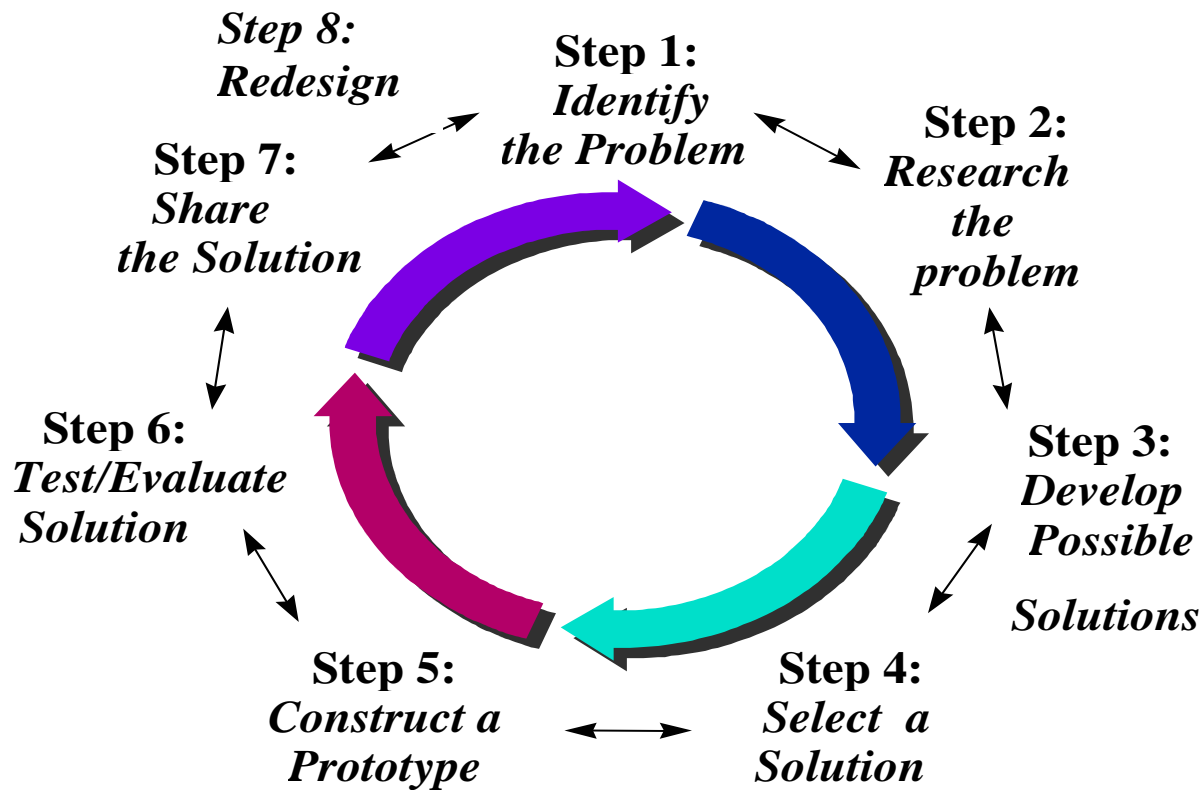
Help!

- **Great showing at Biomechanics Education workshop (>150!)**
- **Wonderful examples and ideas**
- **Overwhelming!!**

- **They've been developing and improving their courses for over a decade.**

Course design

- Think of design process – it's a *process*



Steps for developing a course

- Identify problem
- Set objectives and outcomes
- Choose an approach
- Create deliverables
- Clarify organization
- Develop lectures
- Try it out!

Identify problem

- **Who's the client?**
 - Chair, you, students
- **General objectives**
 - Where it fits in curriculum (dept)
 - Course topics/concepts
- **Constraints**
 - Determine audience
 - Department (ME/BME), level, prerequisites
 - Numbers, time, cost



Set objectives and outcomes

- **Objective:**
 - Aid students in making progress in areas...
 - e.g., improving problem solving in analysis of mechanics of the musculoskeletal system
 - Concepts vs. skills (techniques, software, soft...)
 - Max 3 main objectives
- **Outcomes (e.g., ABET):**
 - By the end of the course students will be able to...
 - e.g., identify, formulate, and solve engineering problems (*ABET criterion 3e*)
 - Evaluated!

Choose an approach

- **Taxonomy-based (Humphrey)**
- **Organ system-based (Ethier)**
- **Challenge-based (Roselli)**

- **Needs to fit your style – but push yourself**
- **Start “slow” and build up - Can be mixed**
- **Regardless**
 - bring in excitement
 - Must be organized



Create deliverables

- **Need to assess individuals... groups?**
- **Formative vs summative evaluation**
- **Mechanisms**
 - HW
 - Quizzes vs. exams
 - Projects
 - Lab (and prelab), simulations
- **Formats**
 - Reports, presentations, posters



Clarify organization

- ***Detailed syllabus***
 - Excitement/philosophy/context
 - Goals, objectives, outcomes
 - Deliverables and grading (%)
 - Outline with dates
 - Specifics
 - Academic integrity
 - Disability/access
 - Student responsibility (web postings)
 - Ask colleagues for examples!

Develop lectures

- **This is up to you... 5hrs/1hr lecture**
- **Depth vs breadth – students need process**
- **Powerpoint vs. chalk**
 - Speed vs. sinking in
 - mixture?
 - Handouts, posting
- **Student attendance/interaction**
 - Questions, controversy, clickers

Example of process

- **Foundations of Biomechanics**
 - Sophomore level
 - BME dept
 - ‘Bridge’ course
 - Large (50-70 students)
 - Process of development and iteration...

BME2504 at WPI

- **Syllabus**
 - **Goals, objectives**
- **Changes**
 1. 2002 – didactic, taxonomy-based
 2. 2003 – added simple demos, two projects
 3. 2004 – reduced to 1 project, added MTS demo
 4. 2005 – chalk talk added, simple prescriptive lab added
 5. 2006 – more defined project, challenge-based lab
 6. 2007 – even more defined project (primary goals), simpler lab conceptually, challenge-based lectures