Course Description

This course provides a studio-based, hands-on, and participatory approach to the development and research of technology tools and curriculum materials.

The course will introduce participatory design models for the development and research of educational materials through a studio-based, materials development project. The course integrates three emerging ideas into a studio experience where education students and technology students will pool their disparate, yet necessary and complementary knowledge and skill sets to work with a teacher to design, program, develop learning activities, field test and revise a curriculum sequence.

The course builds on three major ideas emerging from recent research on technology and learning. The first idea is that the use of domain-specific tools can make the difference in learning conceptual material. For example, in mathematics, tools can transform normally obscure ideas and concepts with multiple, vivid and linked representations and ways to engage in inquiry. The second idea is that even the best software is unlikely to engage learning or be used widely and/or effectively unless it is compatible with and linked to curriculum materials (such as teacher guides, student problems and activities, and assessments). The third idea emerging from recent research is that achieving an effective level of technology integration is virtually impossible without the direct involvement of developers and teachers with the design, development and research processes.

Completed projects will have the chance to be chosen as exemplars for similar courses in universities nationwide, or if they are in mathematics, for widespread publication through the Math Forum (the largest on-line community for math teachers).

The course arranges resources for the work including:
- Workshops/tutorials to help brush up on skills or use new development tools.
- Weekly drop-in sessions for groups with faculty and TA
- Access to a project coach/mentor and an education-related content area expert

Each project team will engage in the following activities:
- Work with a multi-skilled team including education students, computer science students or others.
- Design and develop a technology tool and accompanying curriculum activities in conjunction with a teacher who will act as a client and field test the materials
- Field test the curriculum materials under real classroom conditions, using research and field test methods and processes
- Create and prioritize a revision list and possibly implement one or two items from the list
- Read and review literature concerning theories and practices of curriculum and software design as well as technology use in mathematics and science classrooms
- Review current educational technologies and curriculum materials to delineate best features and best development processes and best teaching practices.
Texts & Resources:


Class Composition:

<table>
<thead>
<tr>
<th>Student Background:</th>
<th>We hope you’ll bring:</th>
<th>What you can get out of the course:</th>
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<tbody>
<tr>
<td>Computer Science/</td>
<td>Basic programming skills (Java, Flash?)/knowledge of</td>
<td>• Understanding of relationship between content and design</td>
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<td>Symbolic Systems</td>
<td>software development</td>
<td>• Experience collaborative development process with designers and teachers (non-technical</td>
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<td>stakeholders)</td>
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<td>• Product-related field research process and techniques</td>
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<td>• Gain understanding of special needs of education environment</td>
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<td>• Possibility submit materials for publication on the Math Forum</td>
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<td>• Advances technology, rapid development of component -based solutions</td>
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<td>LDT/Industrial Engineering</td>
<td>Knowledge of design practices (HCI)/Interest in product</td>
<td>• Hands-on experience managing the R&amp;D process</td>
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<td>development process</td>
<td>• Collaborative design process with programmers &amp; teachers</td>
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<td>• Product-related field research process and techniques; project management</td>
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<td>• Gain understanding of special needs of education environment</td>
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<td>• Possibility to submit materials for publication on the Math Forum</td>
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<tr>
<td>SUSE/LSTD/CTE</td>
<td>Content and teaching knowledge/foundations of education/</td>
<td>• Curriculum development in conjunction with technology tools</td>
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<td>interest or knowledge of R&amp;D process</td>
<td>• Collaborative design process with designers, programmers &amp; teachers (learn how to communicate</td>
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<td>with technical developers)</td>
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<td></td>
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<td>• Product-related field research process and techniques</td>
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</tbody>
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Week 1: January 11
Course introduction, participatory design, get to know you, and demos

Assignments in Progress:
Reflective Assignment explained

Week 2: January 18
Addressing collaboration and the need to attend to it regardless of prior experience. Discuss learning needs and how applet technology can support learning. Pre-project survey.

Readings DUE:
How People Learn: Ch 1-Introduction and Ch 9-Technology to Support Learning


Assignments DUE:
- Reflective assignment (post to Blackboard by 11:59pm January 16th)
- Take a look at postings of 3 classmates

Assignments In Progress:
- Work on technology review project (with at least one other person)

Week 3: January 25
Technology in schools, organizing for observations and forming teams with teachers.

Readings DUE:
How People Learn: Ch 3-Learning and Transfer


Assignments DUE:
- Technology review project—groups present in class

Assignments in progress:
- Meet with partner-teacher and arrange observations during week 4
- Begin brainstorming ideas for an appropriate development tool
- Dewey pre-read
Week 4: February 1
Identifying pedagogical styles, technology and content alignment and preparing for observation.

Readings DUE:


Assignments DUE:
Dewey pre-read. Bring to class.

Assignments in Progress:
Classroom observations and write-ups
Journal #1: early group impressions and process

Week 5: February 8
Development work. Alignment between tools and other curriculum materials.

Readings DUE:


Assignments DUE:
Classroom observations/teacher meeting write-up
Journal #1: Early group impressions and process
Email to booker@stanford.edu and emercier@stanford.edu before class.

Assignment in Progress
- At least 2 prototypes (i.e. paper/user tests with at least 2 people before week 6)
- Meet with content expert by week 6 (we’ll arrange someone for you to meet with)
- Teacher meetings about prototypes
**Week 6: February 15**

Reviewing prototypes and discussing final project direction

**Readings DUE:**

**Assignments DUE:**
Present 2 prototypes and reflections on testing outcomes

**Assignments in progress:**
- Product outlined in GORP
- 2nd round of prototype user testing with one refined idea—emphasis on curriculum integration
- Journal #2 : review of collaboration and what you’re learning from group members

**Week 7: February 16**

Revisiting collaboration and preparing for field testing

**Readings DUE:**


**Assignments DUE:**
- Product outlined in GORP
- Update on project – tool & curriculum integration
- Journal #2 : review of collaboration and what you’re learning from group members

**Assignments in Progress:**
Prepare for in-class practice field test
Week 8: March 1
Draft of Project due, practice field test in class with class members

Assignments DUE:
- Field test during class time with class members to prepare for school field test.

Assignments in progress:
- Field test in classroom
- Reflection on field test
- Preparing for final presentations and final deliverables

Week 9: March 8
Part 1 of Presentation Fair

Assignments DUE:
- Field/user test report:
  - What you learned
  - Ideas for improvement (if you were doing a next round)

Assignments in progress:
  Journal #3: reflection on learning and collaborative process

Week 10: March 9
Part 2 of Presentation Fair and Final Write-ups

Assignments DUE:
- Curriculum Fair
  - Have your software up with an activity for others to complete or for you to demonstrate
  - Have curriculum guide/materials ready for use
  - A poster for your curriculum project
  - Analysis/critique of the group process
  - Analysis/critique of the user tests
- Final Journals submitted including a write up of analysis/reflection on collaborative process