Transitioning an Engineering Course to Studio Format

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Presentation Overview

- Motivation
- “Test Drive”
- Course Modifications
- Assessment / Student Response
- Conclusions
<table>
<thead>
<tr>
<th>Motivation</th>
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| **Course:** EE4902 (*Analog IC Design*)  
  – Junior / Senior / Grad Level |
| **Complaints**  
  – Unsatisfying lab experience for students  
  – Poor retention of material |
| **New studio classroom:**  
  – Completed Summer 2001  
  – Equipment suitable for EE4902 |
Studio Classroom

Capacity:
- 50 students
- 25 stations

NETWORKED PC
SCOPE
DVM
SIGNAL SOURCE
POWER SUPPLY

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<tr>
<th>Problem</th>
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| • Class meeting time:  
  - Fixed at one hour, 4X / week  
• Most studio:  
  - Usually longer meeting times (2-3 hour), 2X / week  
• Is one-hour delivery of studio session possible?  
• Experiment: “Test Drive!” |
<table>
<thead>
<tr>
<th>“Test Drive”</th>
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| **Test lecture with student volunteers**  
  - Explore feasibility of 50-minute studio session |
| **Plan for 50-minute studio session:**  
  - 15 minutes of “traditional lecture” delivery  
  - 20 minutes of lab measurements  
  - 15 minutes of computer simulations |
<p>| <strong>Students complete evaluation form afterward</strong> |</p>
<table>
<thead>
<tr>
<th>Student Population</th>
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<tbody>
<tr>
<td>• Volunteers solicited by e-mail</td>
</tr>
<tr>
<td>– No restrictions: some had taken EE4902 already</td>
</tr>
<tr>
<td>• Bribe Incentive:</td>
</tr>
<tr>
<td>$20 gift certificate to a local restaurant</td>
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<tr>
<td>• 22 volunteers</td>
</tr>
<tr>
<td>– 13 actually showed up for the test drive</td>
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Studio Session Test Drive Results

<table>
<thead>
<tr>
<th>Delivery</th>
<th>PLAN</th>
<th>ACTUAL</th>
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</thead>
<tbody>
<tr>
<td>“Traditional Lecture”</td>
<td>:15</td>
<td>:35</td>
</tr>
<tr>
<td>Lab Measurements</td>
<td>:20</td>
<td>:20</td>
</tr>
<tr>
<td>Computer Simulation</td>
<td>:15</td>
<td>:20</td>
</tr>
</tbody>
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Modify delivery for actual course:

- One hour studio session, 4X / week
  - Lecture plus lab measurements some days
  - Lecture plus simulations other days
- Three hour open lab, 1X / week
  - Allow flexibility for students who need extra time
## Test Drive Student Feedback

- **Most students preferred the new studio format**
  - “I learn by doing – so combining the theory with practice at the same time is great”

- **Many students commented on the quick pace**
  - “I think having a 2-hour class would allow more depth in topics”
  - “The simulation took twice as long as expected”
  - “Some of the time I felt rushed trying to keep up”
Course Assessment

• Three exams given during the 7-week course

• On each exam, one “studio question” directly related to “studio information”
  – Example: waveforms measured from scope

• Hypothesis: students would perform better on “studio questions” than on other “regular questions”
Result: 67% Performed Better on “Studio Questions”

Student Response (Course Evaluations)

- **Positive: Studio format**
  - “Cool to see what we learned in lecture applied immediately after to relate the theory to practice”

- **Negative: Lecture period too short**
  - “Not enough time for labs! Make class 2 hours”
  - “Made it to my 11:00 about 6 times”
### Time Implications

- Options for increasing time in studio session:
  - Schedule allows 2 hour periods, 3X / week
  - Compare contact hours / week in other formats at WPI:

<table>
<thead>
<tr>
<th>Course Format</th>
<th>hours/week</th>
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<tbody>
<tr>
<td>Lecture Only</td>
<td>5</td>
</tr>
<tr>
<td>Lecture + Lab</td>
<td>7</td>
</tr>
<tr>
<td>Proposed Studio</td>
<td>6</td>
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</table>
Conclusions

- Exam results encouraging
  - More assessment in next offering (Spring 2003)
- Studio format is well-received
- 50-minute lecture periods too short
  - Moving to 2 hour periods, 3X / week
- Test drive is an excellent tool
  - Advance information that improved delivery
  - Caution: self-selection of student population
Acknowledgments

- Dr. Brad Lister, RPI

- Dr. Judith Miller, WPI