“Students learn math by doing math.”
A New Approach To College Algebra
Redesign of MATH 1065

Abstract
The Mathematics Department is in the process of redesigning MATH 1065 in response to pass/failure rates and retention. This poster provides an overview of the future of MATH 1065.

Why Redesign?
Annually, over 3,000 students enroll in Math 1065. College Algebra, a course which is characterized as a gatekeeper course at ECU with DF rates around 33%. Our goals for redesigning college algebra are:

- Improve student learning → Increase student success in future courses
- Improve student success → Decrease DF rates
- Accommodate varying levels of preparation and learning styles through customized instruction
- Reduce math anxiety
- Provide a uniform approach to Math 1065
- Lower instructional costs

What is Redesign?
Course redesign is the process of redesigning an entire course to increase student learning and lower costs by taking advantage of the capabilities of technology. It is about rethinking the way we deliver instruction, and bringing 21st century skills into the classroom.

Redesign of MATH 1065
A team of college algebra instructors, along with the department’s chair, went to LSU in April 2011 to learn about redesign. LSU was chosen because of their success with redesigning college algebra and their use of Trigsted e-text materials and MyMathLab. Our experiences at LSU lead to a team of instructors redesigning MATH 1065 during Summer 2011.

This team developed the course syllabus, weekly schedule, class notes, online homework assignments, online quizzes, and online tests that are being used in all sections of MATH 1065. As the Math Department does not have a computer lab to accommodate the large number of students taking MATH 1065, we are piloting one section of the redesigned Math 1065 during the Fall 2011 semester.

In the pilot, students meet with their instructor for 50 minutes a week in a traditional classroom setting. An additional 3 required hours will be spent in a lab setting with their instructor.

During the traditional class time the instructor will:
- Cover difficult topics
- Connect topics and concepts
- Work examples pointing out common student errors and misconceptions
- Guide students through their semester responsibilities
- Discuss study strategies

In the lab, students will:
- Complete homework assignments
- Complete quizzes (multiple chances)
- Complete tests and final exam
- Receive personalized help with concepts and skills

Due to budget cuts, class sizes have increased and the number of sections offered has decreased. To accommodate the increase of class sizes, all other sections are using a hybrid redesign model. The hybrid classes consist of the traditional classroom setting and the student will be using the same online homework and quiz materials (as the pilot) which will be completed outside of class.

Redesign Data
Over the past three years, approximately 10,000 students enrolled in MATH 1065, in which roughly 4,000 students made D’s or F’s.

<table>
<thead>
<tr>
<th>Term</th>
<th>D (%)</th>
<th>F (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>16.4%</td>
<td>18.7%</td>
</tr>
<tr>
<td>Summer</td>
<td>12.8%</td>
<td>18.7%</td>
</tr>
<tr>
<td>Fall</td>
<td>15.3%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Overall</td>
<td>14.3%</td>
<td>22.6%</td>
</tr>
</tbody>
</table>

It is self-evident that improved student performance in MATH 1065 would be most beneficial to ECU’s retention rates, as well as its students’ progression towards graduation. Universities that have redesigned math courses benefited from increased student performance, as indicated in the following table:

Redesign Success at Other Universities

<table>
<thead>
<tr>
<th>College</th>
<th>Course</th>
<th>Traditional DF Rate</th>
<th>Redesign DF Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Tech</td>
<td>College Algebra</td>
<td>10%</td>
<td>7%</td>
</tr>
<tr>
<td>University of Alabama</td>
<td>Intermediate Alg</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>University of Illinois</td>
<td>College Algebra</td>
<td>41%</td>
<td>26%</td>
</tr>
<tr>
<td>ECU</td>
<td>College Algebra</td>
<td>36%</td>
<td>25%</td>
</tr>
</tbody>
</table>

It is ECU Math Department’s hope that we not only achieve these results, but exceed them.

Tools of Redesign: MyMathLab with Trigsted
- Ebook and Guided Notebook
- Interactive videos
- Study Plan and Personalized Assignments
- Study aids for homework assignments
- Online homework, quizzes, and tests with immediate feedback
- Item Analysis: Instructor can identify areas of student weakness and then can provide more instruction on these concepts.
- Email by Criteria: Instructor can email students for both positive or negative feedback.

Conclusions
As a result from our trip to LSU and preceding data, we feel strongly that the redesign of MATH 1065 is imperative for the success of current and future ECU students.

This holistic design to learning mathematics promotes an active approach to learning that addresses a myriad of student learning styles. It emphasizes students “doing” mathematics, not just “watching” someone else do mathematics. The repeated opportunities for practice accompanied by specific, individualized feedback promote learning each new concept to mastery level.

It will be very difficult to complete the redesign of MATH 1065 without the enthusiastic support from Academic Affairs, Facilities Services, ITCs, Math Faculty, and the University Administration.

References


Appendix