



# ENGR 2194 - Fundamentals of Mathematics for Engineers

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# Agenda

- Our school
- Course rationale
  - Math placement
  - Retention data before this course
- Recruitment process
- Course content
- Retention data, grades, and student comments thus far
- Future plans



## Our School

- Large (58,322 students) public university in the Midwest
- 14 majors within the College of Engineering (COE)
- 7752 undergraduate students in the COE (not including the Knowlton School of Arch)
  - 20.1% female
  - 6.3% under-represented minority
- New engineering students are either directly enrolled into the College of Engineering (holistic review) or enrolled in the College of Arts & Sciences (Exploration major)



## Math Placement Test

### Math Placement

### Math Content You Qualify For

### Recommended ENGR Course



**Calculus/Math 1151**

**ENGR 1181**



**Pre-Calculus/Math 1150**

**ENGR 1181**



**College Algebra/Math 1148**

**Gen Ed**

✿ Chemistry 1210/12150 requires level L or M Physics 1250 requires level L

✿ Scholars placing in level N are eligible to take ENGR 1181



## Retention Stats of Math 1148 Students

- 1070 students took Math 1148 (College Algebra) in Autumn 2012
  - 78 of those students were first year OSU students who indicated Engineering (ENG, EXP)
- As of Autumn 2013, 50 of those were still in Engineering
  - 64% retention compared to 80% retention of the general 2012 ENGR population
- As of Autumn 2014, 23 of those are still in Engineering
  - 30% retention compared to 69% retention of the general 2012 ENGR population



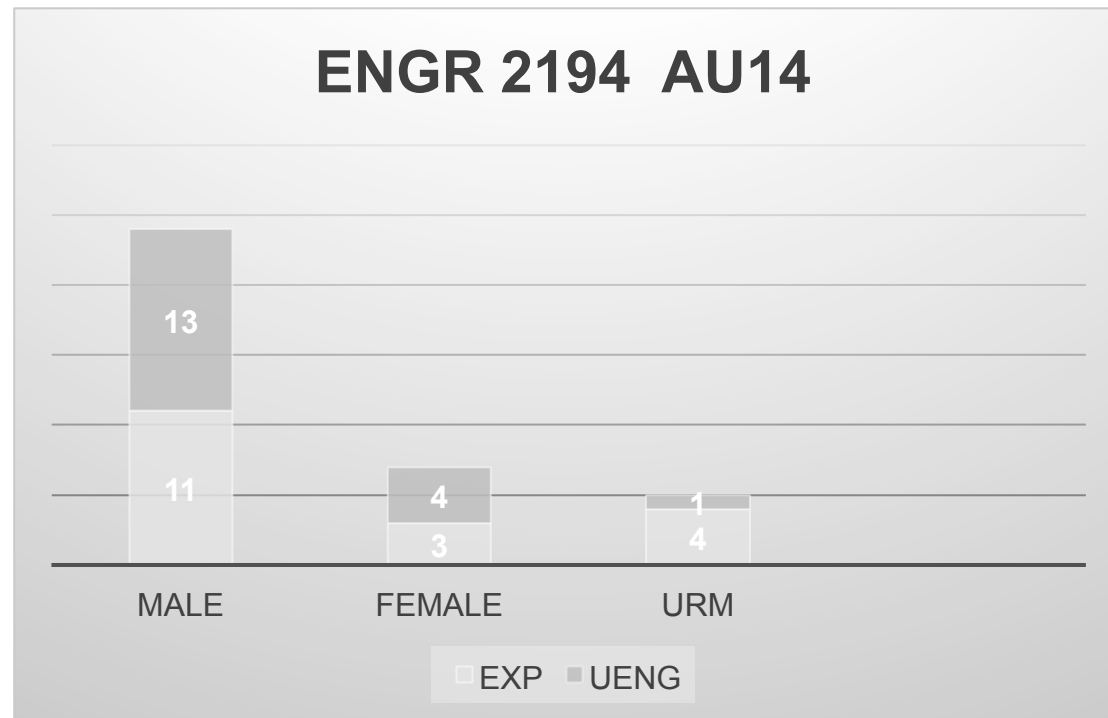
## Diversity Stats of Math 1148 Students

- 20 URM, 13 Female students were first year OSU students who indicated Engineering (ENG, EXP) and took Math 1148 Autumn 2012
- As of Autumn 2013, 14 URM, 9 Female students are still in Engineering
  - 70%/69% retention compared to 75%/77% retention of the general 2012 ENGR population
- As of Autumn 2014, 7 URM, 3 Female students are still in Engineering
  - 35%/23% retention compared to 59%/65% retention of the general 2012 ENGR population



# Recruitment Process

- Review of current NFYS students not eligible for ENGR 1181
- ENGR Orientation
  - open invitation
  - personalized identification
- Exploration Advisors
- Class Enrollment of 31





## ENGR 2194

- Modeled after the Wright State model
- 4 credit hours
- Piloted Autumn 2014 with the blessing of Math Dept
- Meets daily (55 minute lectures (3), 125 minute lab, 80 minute recitation)





# Math Topics

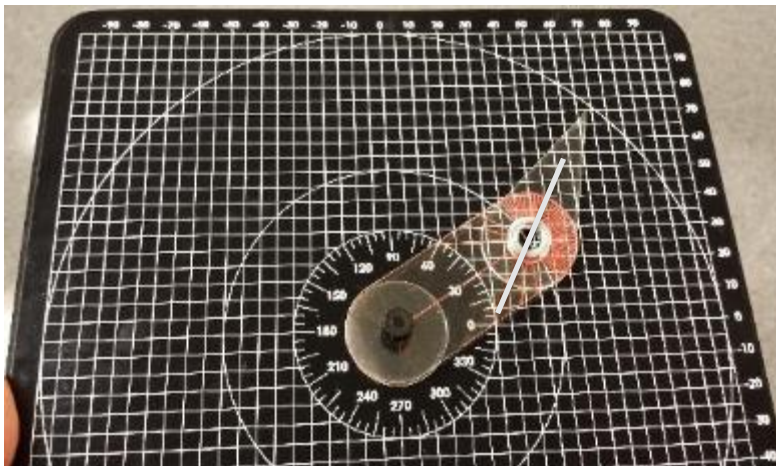
1. Straight Lines
2. Quadratic Equations
3. Trigonometry
4. Two-Dimensional Vectors
5. Complex Numbers

6. Sinusoids
7. Systems of Equations
8. Derivatives
9. Integrals
10. Differential Equations



## Lab Topics

1. One-loop circuit
2. One & two-link planar robots
3. Harmonic signals
4. Two-loop circuit
5. Free-fall
6. Work & energy in a spring
7. Leaking bucket
8. Spring-mass vibration
9. Excel and Matlab





## Recitation Topics

1. How learning works
2. Goal setting
3. Time management
4. Self-awareness & personal responsibility
5. Test-taking strategies
6. Scheduling tips
7. Stress management
8. 13 best ideas



## Retention Thus Far

- 31 students (24 males, 7 females, 5 URM)
- After Autumn 2014 semester
  - 1 transferred to Toledo (still Engineering, wanted to be close to gf)
  - 1 switched to Construction Systems Management
  - 2 students performed poorly in 2194 -did not take ENGR 1181
  - 1 student likely switching to Business – did not take ENGR 1181
  - 1 student likely switching to Computer Science ASC – did not take 1181
  - 81% retention
- After Spring 2015 semester
  - 1 switching to Agricultural Education
  - 1 switching to Business
  - 74% retention



## College Algebra Course Grades

- ENGR/EXP students who took Math 1148 their first semester at OSU
  - Started in Autumn 2012 without ENGR 2194 – Average Math 1148 course grade = 2.4
  - Started in Autumn 2013 without ENGR 2194 – Average Math 1148 course grade = 2.8
  - Started in Autumn 2014 without ENGR 2194 – Average Math 1148 course grade = 2.6
  - Started in Autumn 2014 with ENGR 2194 – Average Math 1148 course grade = 3.2



## Trig Course Grades

- ENGR/EXP students who took Math 1149 at OSU
  - Started in Autumn 2012 without ENGR 2194 – Average Math 1149 course grade = 2.5
  - Started in Autumn 2013 without ENGR 2194 – Average Math 1149 course grade = 2.6
  - Started in Autumn 2014 without ENGR 2194 – Average Math 1149 course grade = 2.6
  - Started in Autumn 2014 with ENGR 2194 – Average Math 1149 course grade = 2.9



## Student Responses

“I really enjoyed this class and I believe it has improved my math skills and over all thinking process greatly.”

“I am so thankful that this opportunity was provided to me. I am much more confident in my math and critical thinking skills and feel much better about beginning the engineering curriculum next semester. It was a course that I thoroughly enjoyed going to and would recommend to future..students..”



## Student Responses

“The workload taught me how to prepare for my future classes and the instructors helped me with this preparation. I’m grateful for the student connections that I’ve made. Support and connections are critical to my success.”





## Future Plans

- This class is the “backbone” for the LSAMP summer bridge program
  - August 5-22, 2015 – 20 URM NFYS students in STEM
- Two sections of ENGR 2194 in Autumn 2015
- Continued assessment and longitudinal study