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University of Toledo
Engineering Applications of Math

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Undergraduate Engineering at UT

- ABET accredited Engineering Science programs
  - BioE, ChE, CivE, CSE, EE, ME
  - Target population for WSU Engineering Mathematics
- ABET accredited Engineering Technology programs
  - Construction, Computer, Electrical, Information Technology and Mechanical
- Mandatory co-op program for all Engineering Science students
  - Three semesters of co-op are required
  - Requires students to stay on schedule in their curriculum

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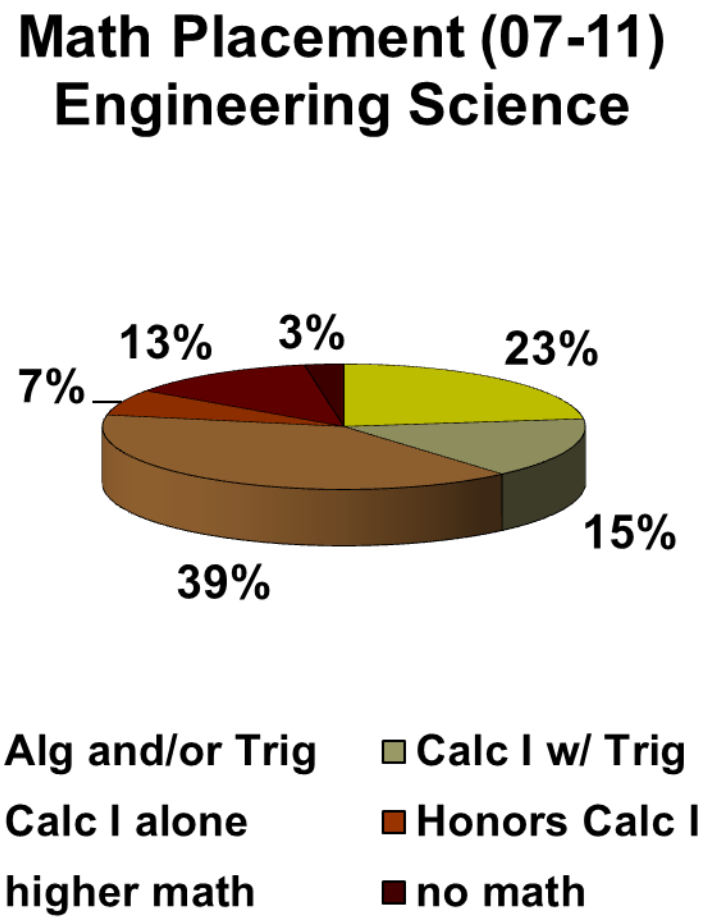
Undergraduate Engineering at UT

- Engineering Science credentials
  - ACT composite 25.9
  - ACT Math 27.2
  - HS GPA 3.65
- First to second year retention
  - 77% remaining in Engineering
  - 86% remaining at UT
- Credentials, retention and subsequent data pooled across 2007 - 2011 entering classes
  - Offered EN math course over this same time frame

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Mathematics Placement

- Placement in Mathematics courses based on various factors
  - ACT or SAT Mathematics score
  - College Algebra placement test
  - Trigonometry placement test
- Our goal is to have students take Calculus I as soon as possible
  - Required for Physics and subsequent Engineering coursework
  - Many students go out on their first co-op after 3rd semester
  - 3 out of 4 first year students are on target or better



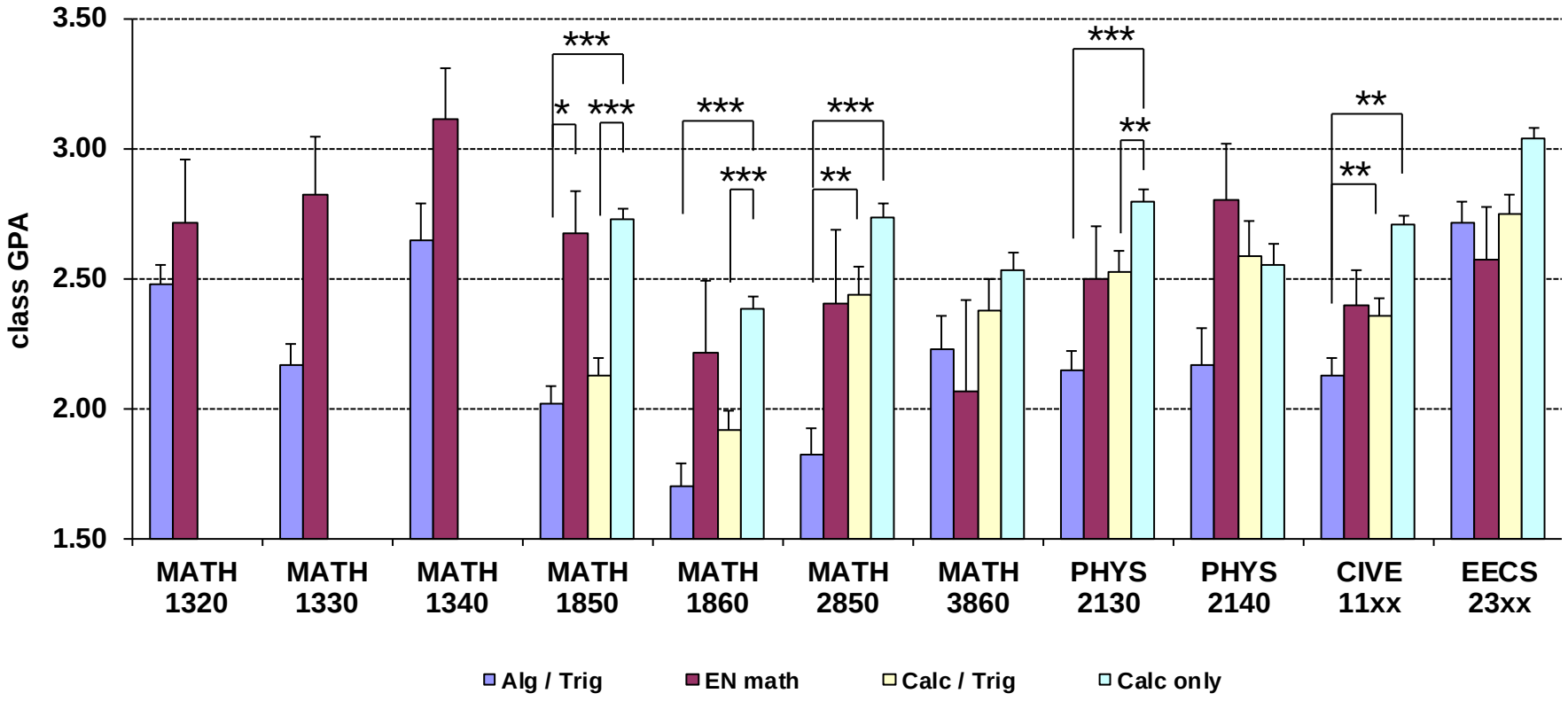
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UT Engineering Applications Course

- Supplement instruction for students that place into Algebra and Trigonometry courses
  - Goal is to improve student performance when they take Calculus I
- Adapted Wright State Mathematics for Engineering Applications Course materials to create optional course
  - Topics range from vectors to differential equations
  - Present applications for each topic then introduce theory
  - Parallel hands-on laboratory reinforces lecture topics
- Provide tangible benefits to encourage students to enroll
  - Reimbursed students for extra tuition incurred for taking course
  - Physics department allows students that complete this course to enroll in Physics I and Calculus I simultaneously

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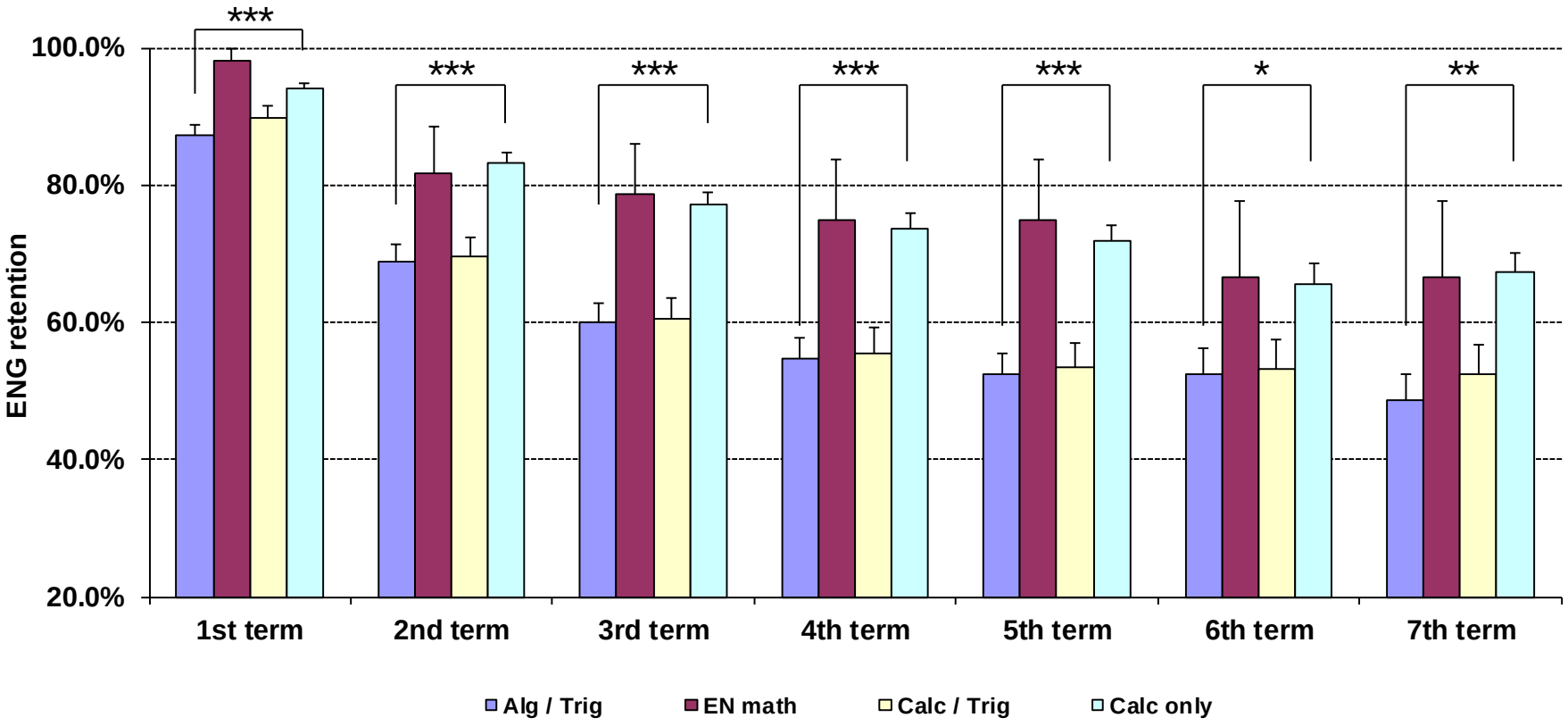
GPA in core courses



* p < 0.05, ** p < 0.01, *** p < 0.001

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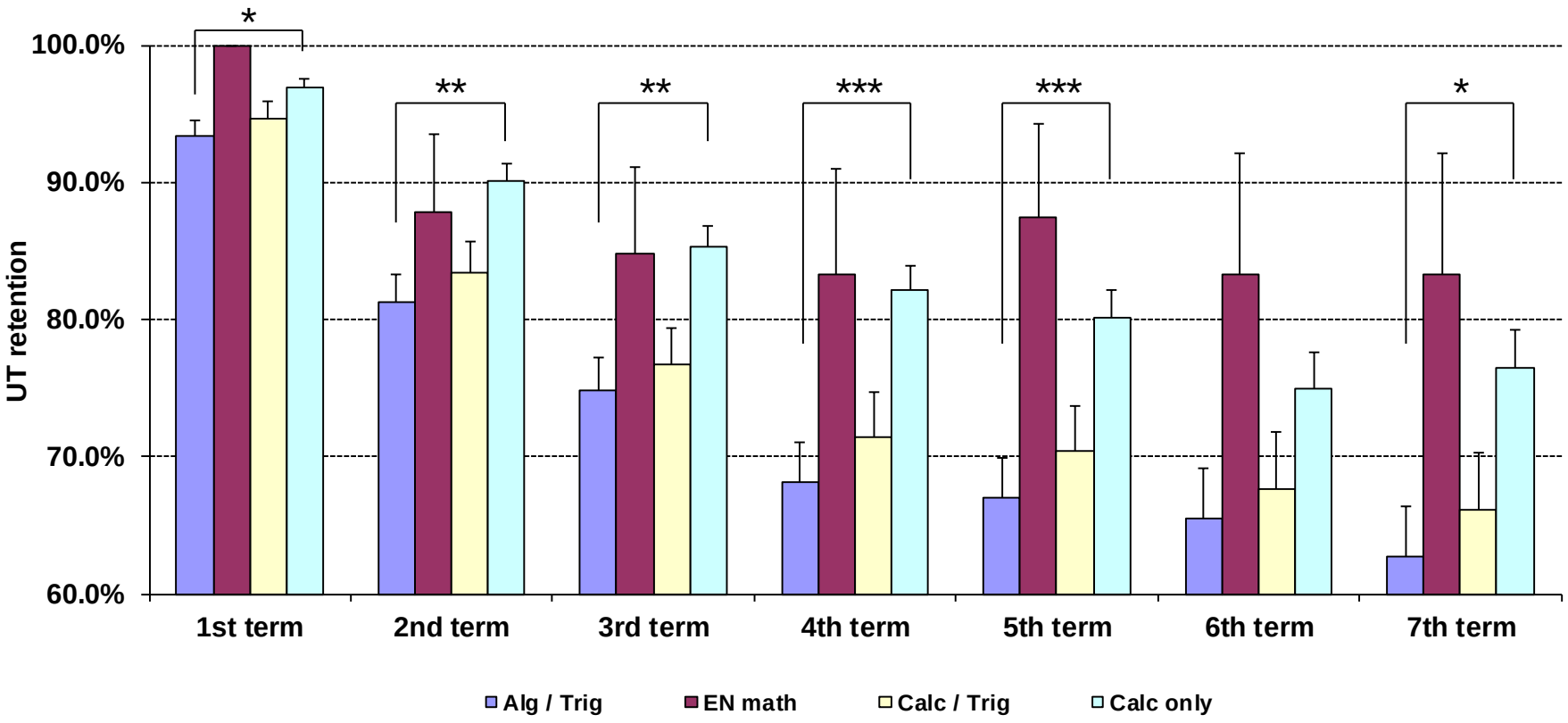
EN retention rate



* p < 0.05, ** p < 0.01, *** p < 0.001

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UT retention rate



* p < 0.05, ** p < 0.01, *** p < 0.001

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We have EN math alumni!

- Ten students completed first offering in Fall 2007
  - 7 / 10 received EN degrees
  - 1 / 10 received non-EN degree
  - 1 / 10 actively completing EN degree for Spring 2013
  - 1 / 10 dropped out of EN and UT after 1st year
- Surveyed our EN graduates for their thoughts
  - 3 / 7 returned surveys
  - All three noted the course content kept appearing in other EN courses throughout their careers
  - All three also noted the course could get overwhelming at times

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Quotes from graduate surveys

- “This class helped me to stay on track with my classmates and helped to motivate me to keep moving forward. It would be discouraging to be a semester behind all the friends you just made.”
- “Many things looked familiar when they were first introduced in these (other EN) courses.”
- “This class was well worth the time to take. It helped me keep on track with the rest of my degree. I would still be in classes this semester if it were not for this class.”

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Conclusions …

NATE – YOU CAN STOP MAKING ME FEEL GUILTY!

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Major changes during the past year

- Established permanent course number
  - Former special topics CIVE 2990 is now GNEN 1800
  - Approval received full support of MATH department
  - UT intends to offer this course Fall 2013 and beyond
- Course has become a de facto requirement through academic advising
  - GNEN 1800 is not required for any degree programs
  - Advisors enroll new students into GNEN 1800 if they do not place directly into Calculus I
  - Enrolled largest class last year with 22 students successfully completing this course
  - Expecting at least 30 students this year and beyond

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Initiative with local high school

- We are currently working with math teachers at Clay HS in Oregon OH
  - Met with mathematics faculty during Spring 2012
- Try to implement EN and science applications in mathematics coursework at all levels (grades 9-12)
  - Linear equations and instrument calibration
  - Quadratics and projectiles
  - Laplace transforms and polynomial algebra
- HS goal is to have qualified seniors enroll in and receive credit for GNEN 1800