Mathematics in the Advanced Technological Education (ATE) Program

V. Celeste Carter, Ph.D.
Program Director
Division of Undergraduate Education
National Science Foundation
vccarter@nsf.gov
ATE Program

- **Education** of science and engineering **technicians** for high-technology fields that drive the nation’s economy.
- **Community and Technical Colleges**
- **Partnerships:** Industry, Economic Development Agencies and Secondary and 4-yr institutions
- **Pathways:** 7-12, 2- and 4-yr
ATE Projects and Centers
292 Active Grants in Spring 2013

- Micro and Nanotechnologies: 23 (8%)
- Advanced Manufacturing Technologies: 35 (12%)
- Information and Security Technologies: 53 (18%)
- Agricultural and Environmental Technologies: 56 (19%)
- General Advanced Technological Education: 46 (16%)
- Bio and Chemical Technologies: 29 (10%)
- Engineering Technologies: 50 (17%)

https://atecentral.net/ate20
Academic-Industry Partnerships

8,000 Business & Industry Collaborations in 2012

Reported purposes of collaboration

- Information about workforce needs: 55%
- General support: 40%
- Developing program content: 22%
- Financial or in-kind support: 21%

Percentage of respondents indicating collaboration served this purpose.

https://atecentral.net/ate20

Source: EvaluATE
Creation of the Bridge to Biotech I

- The Bridge to Biotech was created in 2003
- It was a “learning community” composed of three classes:
  - BTEC 10 - Research Skills for Career Opportunities
  - BTEC 107 - The Language of Biotechnology
  - BTEC108A - Biotech Math
- The Bridge program targets populations that have **NO BIOLOGY** background and 7th-9th grade Math and English skills.
Bridge to Biotech Students

Bio 11 (non-majors Biology) 70.6% pass rate.
Chem 32 (Medical Chemistry) 82.5% pass rate.
Chem 40 (Introduction to Chemical Principles) 96.5% pass rate.
Steve Wendel  
Director, National Center for Manufacturing Education  

Sinclair Community College collaborating with Wright State University.  

Nate Klingbeil, Engineering Dean at WSU, Engineering Math course (EGR 1010)  
(NSF EEC-0343214, DUE-0618571, DUE-0622466, DUE-0817332)  
http://cecs.wright.edu/community/engmath  


With success at the 4 yr. and 2 yr. college level well documented, high school students are now beginning to take the course with articulation paths either directly to Sinclair's Engineering University Transfer (EUT) program or to Wright State's Engineering program.
EGR 1010: Introductory Mathematics for Engineering Applications

- Course Topics
  - Linear & Quadratic Equations
  - Trigonometry
  - Vectors and Complex Numbers
  - Sinusoids and Harmonic Signals
  - Systems of Equations and Matrices
  - Basics of Differentiation
  - Basics of Integration

- All topics driven by *engineering applications* taken directly from core engineering courses
- Lectures reinforced by hands-on laboratory and recitation components including a thorough integration with MATLAB
- Replaces traditional math prerequisites for core sophomore-level engineering courses at WSU – *effectively uncorking the calculus bottleneck to student success in engineering*
Turning Math Remediation into “Homeroom”: Contextualization in Remedial Math Courses and its Influence on Community College Student Learning and Motivational Beliefs

Xueli Wang, Ning Sun, and Kelly Wickersham
Educational Leadership and Policy Analysis
University of Wisconsin-Madison

Presentation at the 39th Annual Conference of the Association for the Study of Higher Education

(NSF Award No. 1104226)
Mathematics Panel

Co-Chairs

Philip Daro
Solomon Garfunkel

Panel

John T Baldwin
Patrick Callahan
Andrew S Chen
Wade Ellis, Jr.
Robert L Kimball, Jr.
Lucy Hernandez Michal
Geri Anderson-Nielsen
Lisa Seidman
Colin L Starr
“In sum, a substantial part of the high school mathematics we teach is mathematics that most students do not need, some of what is needed in the first year of community college is not taught in our schools, and the mathematics that is most needed by our community college students is actually elementary and middle school mathematics…”
Questions?