



ALAMO
COLLEGES

SAN ANTONIO COLLEGE



2015 SAC CCLI Phase 3 7th Annual Report

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Activities and Findings (2009 – 2013)

- ❖ SAC engineering math (EM) course: ENGR 1377
 - *Introductory Math for Engineering Applications*
 - Free, not for credit course
 - Course Materials:
 - WSU course notes with UTSA enhancements
 - Klingbeil/Rattan Textbook, Rev. (since Fall, 2012)
 - WSU Labs w/Univ. of Toledo Enhancements (Labs 2, 3, 4)
 - Teacher: Klaus Bartels, adjunct engineering/math faculty
 - One student teaching assistant/tutor 2010 - 2012
 - Initial course offering in spring, 2009 semester
 - Offered every fall and spring semester thru spring, 2013



Activities and Findings (2009 – 2013)

Enrollment and Course Completion Statistics

Calendar Year	Students Initially Enrolled	Students Completing Course	Students Completing Course (Grades)
2009	9	3	3 (B, C, F)
2010	6	1	1 (C)
2011	4	3	3 (A, B, C)
2012	23	0	-
Spring, 2013	2*	0	-
Totals:	44	7	7 (1-A, 2-B, 3-C, 1-F)

Notes: 4 males and 2 females passed the course

* Two high school teachers (one math, one science)



Activities and Findings (2009 – 2013)

ENGR 1377 Completer Grades in Alamo Colleges Math Courses

Student #	ENGR 1377	Inter. Alg	Plane Trig	College Alg	Precal	Cal I	Cal II
1	B	B					
2	C		B		D		
3	F					B	C
4	C						A
5	A					C	A
6	B					C	B
7	C					C	

Totals (excl. ENGR 1377): 2 A's; 4 B's; 4 C's; 1 D
Passing Grades: 10 of 11 (91%)



Activities and Findings – The “Good”

❖ Student feedback from course completers

- Universally positive
- Rated course very high overall
- Students strongly agreed the course:
 - was enjoyable, especially labs (difficult for some)
 - improved motivation/success in math/engineering classes
 - taught them a lot about engineering applications
 - was valuable to them and met their expectations
 - is one they would recommend to other engineering majors

❖ Textbook praised overall (2012/13 non-completers)

- More & better descriptions of engineering examples desired
 - New 1st edition improves on this



Activities and Findings – The “Bad”

❖ Chronic low enrollment & retention

- Average enrollment: 5 students/semester
- 18% (8/44) retention rate
- Techniques used to improve enrollment:
 - Lowered math prerequisite to Intermediate Algebra
 - Increased marketing (flyers, website banner ads)
 - Spring, 2010: Opened to all five Alamo Colleges
 - Fall, 2011: Opened to STEM high school teachers
- Enrollment improved, then dropped; retention down
 - Enrollment: 9 in 2009; 23 in 2012; 2 in spring, 2013
 - Retention: 3 in 2009; 0 in 2012; 0 in spring, 2013



Activities and Findings – The “Ugly”

- ❖ Reasons for low enrollment & retention
 - Not an approved, for credit course
 - Course not part of 2 or 4-yr engr. curriculum
 - Course not transferable to 4-yr university
 - Not approved as substitute for math prerequisites in physics or engineering courses
 - First course dropped by students when conflicts arise with credited courses or personal issues



Activities and Findings – The “Lost Hope”

Conditions for ENGR 1377 success:

- ❖ ENGR 1377 would be a for credit SAC course
- ❖ ENGR 1377 would be transferable to Texas 4-year universities that are part of CCLI Phase 3
 - University of Texas at San Antonio (UTSA)
 - University of Texas at El Paso (UTEP)
 - Texas A&M-Kingsville (TAMUK)
 - SAC received transfer support letters for ENGR 1377 from TAMUK and UTEP in June, 2010 but not as a course leading to a degree.



Activities and Findings – The “Lost Hope – cont’d”

- ❖ SAC Curriculum Committee did not approve the course for credit
 - Reason: Equivalent course at 4-year institutions is not included as a required course in engineering curriculums
 - SAC requested course be approved/credited as a unique needs course by Academic Council.
 - Request tabled by Curriculum Committee in 2011
 - Lack of sufficient info. proving benefits to students
- ❖ Incorporate elements in Intro to Engineering course
 - Problems:
 - Approx. 41% of engineering freshmen in remedial math
 - Very little room in course for adding topics

Activities and Findings – “New Hopes”

- ❖ Divide and Conquer – Approach #1:
 - Included two EM labs in 6-week summer EDGE program
 - EDGE program for HS students interested in engineering
 - Algebra and System of Equations Circuits Labs
 - Labs well received by most students
 - Used in 2013 and 2014 EDGE programs





Activities and Findings – “New Hopes”

- ❖ Divide and Conquer – Approach #2:
 - Incorporate selected science and engineering applications from EM course/textbook in math courses at SAC
 - Algebra (remedial and college-levels)
 - Pre-calculus
 - Calculus I and II
 - Differential Equations
 - Collaborating with Math Department faculty
 - Provided textbooks to 9 Math Dept. faculty in August 2014
 - Results: Some using textbook examples in math classes



Activities and Findings – “New Hopes”

- ❖ Divide and Conquer – Approach #3:
 - Engineering applications prof. development seminar
 - Developed in collaboration with ESC-20*
 - 6-hour Saturday session doing 9 hands-on activities
 - Structures, geometry, fuel cell car, circuits, rockets, and more
 - Learn how engineers use STEM to creatively solve real-world challenges as well as exploring a variety of ways for students to understand and get excited about engineering
 - Provided to MS math/science teachers in March, 2014
 - Highly positive feedback from participants & ESC-20

*Education Service Center, Region 20

Activities and Findings – “New Hopes”

- ❖ Divide and Conquer – Approach #3 - Photos:
- ❖ Engineering and Math are FUN!!



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Activities and Findings – “New Hopes” – Approach #4

❖ Created EGR 1001 - EM Continuing Education Course

- ‘Introductory Math for Engineering & Science Applications’
- Targeted at High School math and science teachers
- College students attend as well

❖ Primary benefits:

- Improve teacher's understanding of how to apply scientific principles and mathematical concepts/methods to analyze/solve practical application problems in science and engineering, which they can pass on to their students
- Improve math skills and motivation for and support of engineering

❖ ENGR 1377 vs EGR 1001

- Contact hours reduced from 78 hours to 48 hours (3 hours, once per week)
- Eliminated differential equations topics
- Reduced number of examples covered – reduced labs from 9 to 6
- Focuses on problem solving and labs & reduced lecture time

❖ Course offered for Fall, 2013 and Spring & Fall, 2014

- Courses did not make – only a few persons enrolled
- Teachers too busy and can't commit to weekly scheduled class times



Activities and Findings – “New Hopes” Improved Approach #4 (cont’d)

- ❖ 2015 - Restructured EGR 1001 EM CE course
 - Created hybrid (blended) EGR 1001 course
 - Better meets students’ availability, needs, and interests
 - Students select minimum of 4 out of 9 EM topics/chapters from Klingbeil/Rattan Textbook, 1st Ed
 - No lectures – students read textbook at own pace and email completed textbook homework problems for grading
 - Labs and Initial/Final Assessment done in classroom
 - Students select best dates for them to do labs
 - Tuesday/Thursday evenings and Saturday AM lab times offered
 - Students must successfully complete minimum of 70% of assignments to pass and get completion certificate



Activities and Findings – “New Hopes” Improved Approach #4 – cont’d

❖ New Hybrid EGR 1001 EM CE Course

- Offered in 8-wk spring, 2015 semester (Mar-May)
- Results: 100% retention – substantial improvement

Student #	Status	Initial Assessment	Final Assessment	Assessment Improvement	Course Grade
1	HS Math Teacher	77	99	22	99 (P)
2	HS Math Teacher	68	98	30	99 (P)
3	HS Math Teacher	70	93	23	96 (P)
4	SAC Engr Student	19	83	64	88 (P)
Averages:		58.5	93.25	34.75	95.5 (P)

- Passing students received 4.8 CEUs, textbook, & tuition stipend
- Student feedback highly positive:
 - “I really enjoyed the opportunity to study the topics that best fit my interests. The open schedule was great...” (HS math teacher)
 - “I need a refresher math class and be able to connect math to engineering problems. This closed the gap.” (college sophomore)
 - “I now have a book full of extra material I can use with my students in project-based labs or inquiry-based activities.” (HS math and physics teacher)
- To be offered again to STEM students and teachers in fall, 2015



Activities and Findings – “New Hopes” – Approach #5

- ❖ In the spring of 2015 Texas Higher Education Coordinating Board initiated the Engineering Field Of Study Committee to provide an overview of the engineering, **math**, and science courses required at the lower-division level by universities represented on this committee.
- ❖ The June 19th meeting will provide data compiled from the spreadsheets submitted by every participating institution. Additionally, Dr. Rex Peebles, Assistant Commissioner for Academic Quality and Workforce, will discuss Texas Education Code 61.823 with the committee. This statute defines field-of-study curricula and how they transfer. The committee requested further interpretation of the statute at its March meeting.



Conclusions

- ❖ ENGR 1377 traditional lecture/lab course no longer offered
 - Very low enrollment and completion rate due to hopelessness of resolving crediting/transferability issues
- ❖ Continue using 1 or 2 EM labs in EDGE program
- ❖ Incorporate EM examples in SAC math courses
- ❖ EGR 1001, 16-week CE EM course failed -
- ❖ Hybrid EGR 1001 EM course for teachers & students holds promise. Offered in fall, 2015. Need higher enrollment.
 - Students select EM topics to study and preferred lab times
- ❖ Unless the THECB approves an Introductory Math Course for Engineers Math will continue to be a problem
- ❖ SAC remains a strong advocate of CCLI effort
- ❖ Thanks to WSU's support



To be continued...

"Life's like a movie. Write your own ending." (Kermit the Frog)



Questions?