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HISTORY

- During our last major curricular reform (c. 1997), the Department of Civil and Environmental Engineering added CEE 100 Introduction to CEE; 3 QCH. It is still taught in Fall Quarter, Freshman Year.
- One goal of the class was to show students how freshman year classes in Math and Science related to Engineering.

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HISTORY

- UC joined the CCLI grant with WSU in 2007.
- CEE 103, Introduction to CEE Math was added to Fall Quarter, Freshman Year. It is a 2 QCH class.
- The class specifically showed applications of math to CEE.

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HISTORY

- At this same time, it was clear UC was switching to semesters.
- In a parallel effort, Electrical and Computer Engineering proposed a semester based, year long course called “Math and Models” which became Engineering Models.
- Since this was similar to CVE 103, CVE 103 became the beta version.

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HISTORY

- In 2008, the Department of Engineering Education was formed in College of Engineering.
- UC will move to semesters in 2012. In 2010, the College of Engineering accepted semester curricula for all Degree Programs which included ENED 1090 and ENED 1091; Engineering Models I and II.

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HISTORY

- In July of 2010, the College of Applied Science and the College of Engineering were merged.
- In the merger, the School of Engineering Education got two former CAS faculty (one from math and one from EE) who were placed in charge of Engineering Models I and II.

HISTORY

- CVE (formerly CEE) 103 is still a one quarter pilot for Engineering Models.
- From 2007-09, it was taught only to CE Freshmen.
- In 2010 (to be repeated in 2011):
  - CVE 103 was taught to CE Freshmen in F and AET/CM Freshmen in W.
  - Sch of Eng. Ed. Taught a year long Engineering Models to BME.

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HISTORY

- Initially, CEE/CVE 103 was a lecture based class on math applications.
- About 50% of the class was Vector Mechanics
  - Helped the students in Physics 201
  - Fundamental to CE
  - Addresses many math subjects (algebra, trig, matrix/systems)
- Stats, Diff. Eq., Graphing also covered.

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HISTORY

- In 2009 the class was converted to MATLAB
  - Engineering Models is to be MATLAB based.
    - Programming highlights problem solving skills.
    - Students can solve more problems with the computer.
    - Can show CE applications.
  - Anticipated using this to replace programming in semesters.

2010 Modules

- Vector Mechanics (lecture and lab)
- Programming vectors (addition, subtraction, dot/cross products).
- Solving a truss (matrix math, solution to systems of equations).
- Graphing
- Numerical Differentiation, Integration
  - Distance, Velocity, Acceleration

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2010 Modules

- Differential Equations – dynamic response of buildings (CE only)
- Statistics – qualification of concrete by cylinder strengths (AET/CM only).
- Log/log and semi-log graphs – Weir calibration (AET/CM).

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FINDINGS SP -10 CE

1.	CEE 103 increased my motivation to study engineering.	3.52
2.	CEE 103 increased my chances of success in engineering.	3.79
3.	CEE 103 has increased my motivation to study math.	3.42
4.	CEE 103 increased my chances of success in future math courses.	3.65
5.	The computer work aided my understanding of the lecture material.	3.44
6.	The lab sections aided my understanding of the lecture material.	3.27
7.	Application of MATLAB was a valuable component of this course.	3.63
8.	CEE 103 helped me in Physics I.	3.46
9.	CEE 103 helped my problem solving skills.	3.54
10.	CEE 103 helped me in Mech I.	3.71

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FINDINGS A -10 CE

CVE 103 - Autumn 2010	AVERAGE
This course has increased my motivation to study engineering/technology.	3.357
This course has increased my chances of success in engineering/technology.	3.929
This course has increased my motivation to study math.	3.482
This course has increased my chances of success in future math courses.	3.714
The lectures aided my understanding of vector math and mechanics.	3.768
The lab section aided my understanding of the lecture material.	3.411
Application of MATLAB was a valuabe component of this course because it helped me break down problems and learn problem solving skills.	3.607

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FINDINGS A-10 CE

Autumn 2010	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
This course has increased my motivation to study engineering/technology.	6	18	24	6	2
This course has increased my chances of success in engineering/technology.	14	28	10	4	0
This course has increased my motivation to study math.	14	11	23	4	4
This course has increased my chances of success in future math courses.	10	27	13	5	1
The lectures aided my understanding of vector math and mechanics.	14	24	11	5	2
The lab section aided my understanding of the lecture material.	10	16	21	5	4
Application of MATLAB was a valuabe component of this course because it helped me break down problems and learn problem solving skills.	13	23	9	7	4

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FINDINGS W-11 (AET/CM)

CVE 103 – Winter 2011	AVERAGE W11	AVERAGE A10
This course has increased my motivation to study engineering/technology.	2.888	3.357
This course has increased my chances of success in engineering/technology.	3.186	3.929
This course has increased my motivation to study math.	2.907	3.482
This course has increased my chances of success in future math courses.	3.279	3.714
The lectures aided my understanding of vector math and mechanics.	3.674	3.768
The lab section aided my understanding of the lecture material.	3.790	3.411
Application of MATLAB was a valuable component of this course because it helped me break down problems and learn problem solving skills.	3.279	3.607

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FINDINGS W-11 (AET/CM)

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
		5	4	3	2	1
1	This course has increased my motivation to study engineering/technology.	0	11	19	10	3
2	This course has increased my chances of success in engineering/technology.	4	14	14	8	3
3	This course has increased my motivation to study math.	3	10	15	10	5
4	This course has increased my chances of success in future math courses.	6	14	12	8	3
5	The course aided my understanding of vector math and mechanics.	8	21	8	4	2
6	The course helped me see the connection between math and engineering.	11	18	10	2	2
7	Application of MATLAB was a valuable component of this course because it helped me break down problems and learn problem solving skills.	8	12	12	6	5

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FINDINGS

CVE 103 -	SP10	F10
This course has increased my motivation to study engineering/technology.	3.52	3.357
This course has increased my chances of success in engineering/technology.	3.79	3.929
This course has increased my motivation to study math.	3.42	3.482
This course has increased my chances of success in future math courses.	3.65	3.714
The lectures aided my understanding of vector math and mechanics.		3.768
The lab section aided my understanding of the lecture material.	3.27	3.411
Application of MATLAB was a valuable component of this course because it helped me break down problems and learn problem solving skills.	3.63	3.607

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FINDINGS

- Grad student correlated rating in W11 to student performance
- Rating correlated with student grade
  - Not surprising – research shows student evaluations tend to track with grade student expects in class.
- Anecdotally, Grad student indicated that highest rankings came from students who showed interest in class and those who showed no interest ranked the class low. Indicators of “interest”:
  - Came to see TA for help, not answers.
  - Did all or most of the HW
  - No indication of copying HW

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FINDINGS

- Looked at retention of class starting in F08
  - Second year of CVE103. Had the "bugs worked out" by this time.
  - Students in 3rd year – class "stabilized"
  - 91 students took it, 45 still in CVE = 50% retained
  - Usual is about 45%. Is the increase significant?

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FINDINGS

- College data indicates that CVE students do better in Calculus and Physics.
  - Could be due to CVE 103
  - CE is a popular major, has one of the highest admission requirements.

INSTRUCTOR'S THOUGHTS

- HS Math preparation is very uneven.
  - Often weak in trig and algebra.
- Certain subjects are NOT covered in HS (e.g. centroids).
- Student knowledge is mechanical and rote. Any deviation throws them off.
  - Example: $y= x^2$; $dy/dx = 2x$; $y=t^2$, $dy/dt=$ don't know!

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INSTRUCTOR'S THOUGHTS

- Overreliance on a calculator
  - Can't program a graph because they do not know how to graph a function!
- Actual problem solving skills are uneven.

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IN 2011

- Dr. Shahrooz will teach the class (examine if the class is portable to a different instructor).
- Reworking modules with the instructors of the Engineering Models pilot.
- Will still have CE in Fall and AET/CM in W.

2011 Rework of Modules

- Try to get greater clarity in the programming as a means to problem solving.
- Improve the explanations of problem solving by spelling out more steps.
- Adjust material to be more relevant to CE
  - Challenge – it can get to complex and go over their heads!

2011 Rework of Modules

- Discussion of using structural dynamics as the basis.
- Start with the idea of structural dynamics as a differential equation “big picture”.
- Then, back up and step them through
  - Vectors/Equilibrium
  - Acceleration/Velocity/Distance
  - Graphing
  - Etc.

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2011 Rework of Modules

- Are Powerpoints the best method of delivery??
  - Students may not pay attention because they can get slides on line
  - Often, the projection screen obscures the board so you can't write and project at same time.
  - BUT – it is much clearer and easier to see the programs in PPT and better diagrams can be shown.

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BETTER FEEDBACK?

- Students seem to “work together” on HW. One solves it and the rest use the same solution.
  - Weekly quizzes???
- How do we evaluate better
  - Hard because ½ the class leaves and ½ are transfers.
  - Hard to separate CVE 103 from other factors.

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