

Report to External Review Board

*Brigham Young University
Civil & Environmental Engineering
October 14, 2005*

ABET Accreditation

- ABET requires outcomes-based strategy with clear objectives and assessment tools
- Passed review in Fall, 2002
- Next review → 2008

What Now?

- Process is now established
- Continue to collect assessment data
- Tweak, refine program based on feedback

Changes/Activities in 2004-2005

- Automated archival of exam-comp data and student evaluation data
 - Data archived to central MySQL database
 - Automated data posting
 - Automated faculty review system
- Provided report to college for university accreditation
- Curriculum changes

Program Educational Objectives

- Provide our students with a broad-based educational experience including an exposure to the liberal arts and a strong foundation in basic math and science
- Maintain a strong program built around four fundamental civil engineering disciplines: geotechnical engineering, structural engineering, transportation engineering, and water resources and environmental engineering
- Develop civil engineering graduates with integrity and a commitment to the gospel of Jesus Christ and who are prepared for life-long service to community, church, and profession

Outcomes

1. An understanding of fundamental principles of mathematics and science
2. An understanding of fundamental engineering science
3. An understanding of geotechnical engineering
4. An understanding of structural engineering

Outcomes, pt II

5. An understanding of transportation engineering
6. An understanding of water resource and environmental engineering
7. The ability to design civil engineering systems and solve open-ended problems
8. The ability to communicate ideas effectively

Outcomes, pt III

9. The ability to use modern engineering tools
10. An understanding of professional practice and a commitment to life-long learning.
11. An awareness of cultural, societal, and environmental issues
12. A commitment to serve as professional engineers of integrity and faith

Sample Competencies

Attribute 3: An understanding of geotechnical engineering

Description: Students will obtain a basic understanding of geotechnical engineering principles including soil classification, seepage, consolidation, shear strength, and bearing capacity analysis. Students will also learn how to perform and apply fundamental laboratory tests on soils.

Competencies:

- 3.1 Be able to perform fundamental calculations and analyses including weight-volume relationships and soil classification. Understand issues related to clay mineralogy.
- 3.2 Understand basics principles of flow through porous media including Darcy's law, the equation of continuity, seepage forces, and flow nets.
- 3.3 Understand how stresses are transferred through soils. Be able to compute both geostatic stresses (total stress, effective stress, and pore pressures) and induced stresses due to point, line, and area loads.

Assessment Tools

- Exam-competency tracking
- FE Exam
- Exit Interviews
- Student Evaluations
- External Review Board
- Alumni Survey

Exam Competency Data

- Core component of assessment strategy
- Participation rates back up (thanks!)
- Still working out some kinks in the archival system

Exam Competency Database

Edit Exam-Competency Class Record

Year:
Semester:
Course:
Section:
Instructor:

Competency	# Questions	% Correct
3.1	36	86.94
3.2	36	92.55
3.3	36	87.87
3.4	12	94.91

Based on the summary of the exam-competency data for this section, did you find any weaknesses in the course? Yes No

If the answer to the previous question is yes, please describe the weaknesses and discuss what plans you have to modify the course to address these weaknesses (max 255 chars):

Students seem to performing well in the course and doing well in each of the areas. No significant changes are planned.

LaVera B. Merritt
31 Jan 2005

<http://www.et.byu.edu/groups/civilabet/database/>

Exam Comp - Summary

Attribute	F00	W01	Sp01	Su01	F01	W02	Sp02	Su02	F02	W03	Sp03	Su03	F03	W04	Sp04	Su04	F04	W05	Sp05	Su05	Mean
1. Basic math & science		85.9		79.9	85.5	87.1	88.9		80.2				69.4	79.6					73.2		84.5
2. Engineering fundamentals	70.2	75.1	78.5	77.6	78.3	73.4	82.2	71.8	76.0	80.0	80.1		78.5	65.8	82.5	85.1	79.5	79.0	69.7	79.7	75.7
3. Geotechnical engineering	84.7	85.5			81.5	85.9			83.6	81.0			80.8	69.1			77.6	75.1			78.7
4. Structural engineering	79.5	80.8	91.2		81.6	84.5			78.1	82.4			86.0	76.7			84.7	81.5			82.8
5. Transportation engineering	74.9		77.5		78.3	75.0	75.3		78.3		69.6		76.0		81.4		73.7		81.3		76.4
6. Water resource/env. Eng.	78.7	75.7	80.7	77.0	75.9	80.7	70.4	67.6	71.2	78.0	85.7	75.9	74.6	71.9	82.0	82.9	73.9	63.1	76.0	72.9	74.2
7. Design	81.1	85.9	84.5	79.3	77.4	85.4	78.6		84.6				65.1		79.5		71.9	96.2	84.5		81.0
8. Communications	93.8	94.5								91.1											93.4
9. Modern engineering tools	80.5		81.4		82.0		77.6		81.3	78.7			86.7		85.7		84.8	88.0	88.4		83.4
10. Professional practice	99.1				98.9				100.0												99.2
11. Cult. soc. env. Awareness	96.8	73.4		75.2		98.7	71.4		89.0	97.1									98.8		76.8
12. Integrity, faith	85.4	83.3		77.8		94.6			90.9	83.3									90.8		85.8

Yearly Results (by academic year)

Attribute	00-01	01-02	02-03	03-04	04-05	Mean
1. Basic math & science	85.7	86.9	80.2	77.4	73.2	84.5
2. Engineering fundamentals	72.7	75.4	78.2	75.0	78.8	75.7
3. Geotechnical engineering	85.2	84.7	81.7	70.7	75.9	78.7
4. Structural engineering	80.9	83.0	79.4	83.1	84.5	82.8
5. Transportation engineering	75.6	77.1	76.7	77.8	75.6	76.4
6. Water resource/env. Eng.	76.2	74.5	76.5	75.5	68.3	74.2
7. Design	83.6	79.8	84.6	69.6	82.1	81.0
8. Communications	94.2		91.1			93.4
9. Modern engineering tools	80.7	81.8	80.5	86.1	85.7	83.4
10. Professional practice	99.1	98.9	100.0		98.8	99.2
11. Cult. soc. env. Awareness	74.7	81.0	92.9			76.8
12. Integrity, faith	83.9	94.6	84.3		90.8	85.8

Yearly Results (by academic year)

Attribute	00-01	01-02	02-03	03-04	04-05	Mean
10. Professional practice	99.1	98.9	100.0		98.8	99.2
8. Communications	94.2		91.1			93.4
12. Integrity, faith	83.9	94.6	84.3		90.8	85.8
1. Basic math & science	85.7	86.9	80.2	77.4	73.2	84.5
9. Modern engineering tools	80.7	81.8	80.5	86.1	85.7	83.4
4. Structural engineering	80.9	83.0	79.4	83.1	84.5	82.8
7. Design	83.6	79.8	84.6	69.6	82.1	81.0
3. Geotechnical engineering	85.2	84.7	81.7	70.7	75.9	78.7
11. Cult. soc. env. Awareness	74.7	81.0	92.9			76.8
5. Transportation engineering	75.6	77.1	76.7	77.8	75.6	76.4
2. Engineering fundamentals	72.7	75.4	78.2	75.0	78.8	75.7
6. Water resource/env. Eng.	76.2	74.5	76.5	75.5	68.3	74.2

(sorted)

Participation vs. Semester

Exam-Competency Assessment Archival History

Civil & Environmental Engineering - Brigham Young University

	F-00	W-01	Sp-01	Su-01	F-01	W-02	Sp-02	Su-02	F-02	W-03	Sp-03	Su-03	F-03	W-04	Sp-04	Su-04	F-04	W-05	Sp-05	Su-05
CE En 103-1																				
CE En 103-2																				
CE En 112																				
CE En 113																				
CE En 203-1																				
CE En 203-2																				
CE En 204-1																				
CE En 204-2																				
CE En 270																				
CE En 271																				
CE En 305																				
CE En 321																				
CE En 332																				
CE En 341																				
CE En 351																				
CE En 361																				
CE En 424																				
CE En 431																				
CE En 433																				
CE En 470																				
RelC 491/492																				

Legend:
 = course not offered
 = assessment completed
 = no assessment

Exit Interview Data

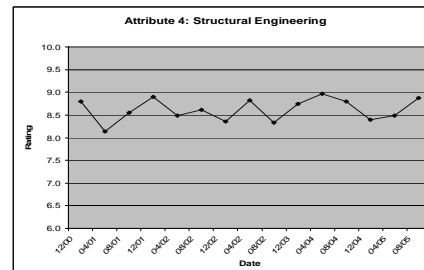
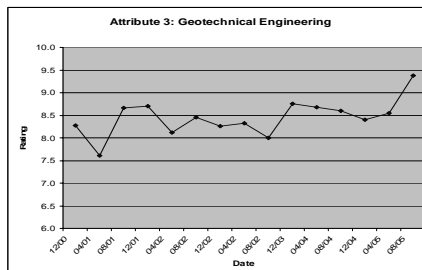
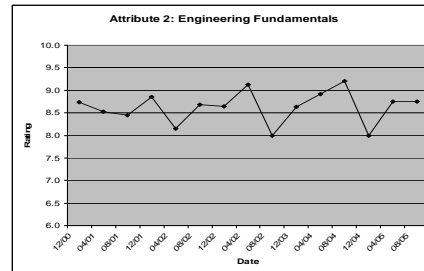
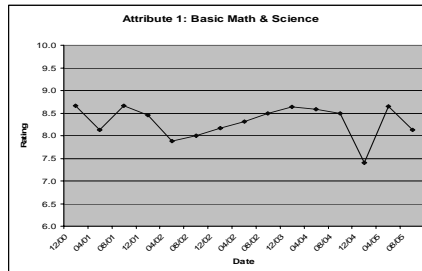
Attribute	12/00	04/01	08/01	12/01	04/02	08/02	12/02	04/02	08/02	12/03	04/04	08/04	12/04	04/05	08/05	Average	Scaled
1. Basic math & science	8.7	8.1	8.7	8.5	7.9	8.0	8.2	8.3	8.5	8.6	8.6	8.5	7.4	8.7	8.1	8.3	83.1
2. Engineering fundamentals	8.7	8.5	8.4	8.9	8.2	8.7	8.7	9.1	8.0	8.6	8.9	9.2	8.0	8.8	8.8	8.6	86.3
3. Geotechnical engineering	8.3	7.6	8.7	8.7	8.1	8.5	8.3	8.3	8.0	8.8	8.7	8.6	8.4	8.6	9.4	8.5	84.5
4. Structural engineering	8.8	8.1	8.6	8.9	8.5	8.6	8.4	8.8	8.3	8.8	9.0	8.8	8.4	8.5	8.9	8.6	86.2
5. Transportation engineering	6.3	6.8	7.0	7.7	7.3	7.9	7.0	7.4	6.3	7.1	7.5	7.2	7.4	8.3	8.1	7.3	72.8
6. Water resource/env. Eng.	8.5	8.4	9.1	8.9	8.3	8.6	8.7	8.7	8.5	8.6	8.3	9.4	8.4	8.9	9.1	8.7	86.8
7. Design	7.6	8.0	8.6	8.5	7.6	8.3	8.1	8.4	7.5	8.3	7.9	7.8	7.6	7.6	7.4	7.9	79.3
8. Communications	7.5	7.8	7.8	8.1	8.1	8.1	8.3	8.7	6.7	8.8	7.8	7.9	7.3	8.2	8.9	8.0	79.8
9. Modern engineering tools	7.5	8.7	8.9	8.6	8.5	9.1	9.3	9.2	6.7	8.6	8.8	8.8	7.6	8.0	9.0	8.5	84.9
10. Professional practice	8.7	8.5	9.0	9.3	8.6	8.9	8.6	9.2	7.8	8.9	9.0	9.8	8.0	8.6	9.5	8.8	88.3
11. Cult., soc., env. Awareness	8.3	8.0	8.4	7.9	8.0	8.3	8.9	8.1	6.8	8.6	7.2	7.8	7.1	8.5	8.4	8.0	80.4
12. Integrity, faith	9.6	9.3	9.6	9.7	9.1	9.5	9.6	9.6	8.7	9.8	9.8	9.2	8.4	9.6	9.6	9.4	94.0

By Academic Year	00-01	01-02	02-03	03-04	04-05
1. Basic math & science	8.5	8.1	8.3	8.6	8.1
2. Engineering fundamentals	8.6	8.6	8.3	8.9	8.5
3. Geotechnical engineering	8.2	8.4	8.2	8.7	8.8
4. Structural engineering	8.5	8.7	8.2	8.8	8.6
5. Transportation engineering	6.7	7.6	8.2	7.3	7.9
6. Water resource/env. Eng.	8.7	8.6	8.4	8.8	8.8
7. Design	8.1	8.1	8.3	8.0	7.5
8. Communications	7.7	8.1	8.4	8.1	8.1
9. Modern engineering tools	8.4	8.7	8.6	8.7	8.2
10. Professional practice	8.7	8.9	8.6	9.2	8.7
11. Cult., soc., env. Awareness	8.3	8.1	8.6	7.9	8.0
12. Integrity, faith	9.5	9.4	9.3	9.6	9.2

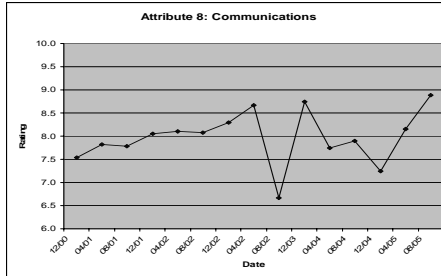
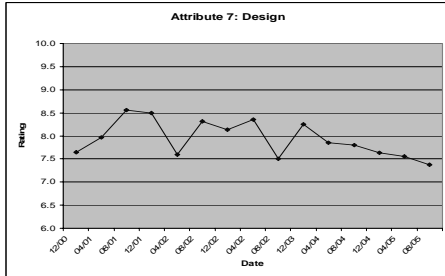
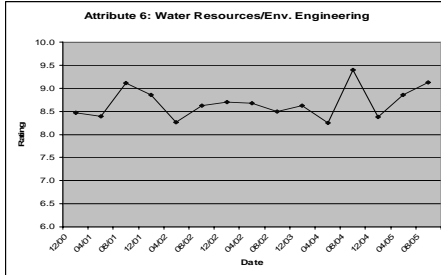
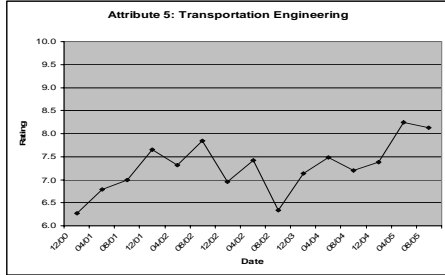
By Academic Year	00-01	01-02	02-03	03-04	04-05	Ave
12. Integrity, faith	9.5	9.4	9.3	9.6	9.2	9.4
10. Professional practice	8.7	8.9	8.6	9.2	8.7	8.8
6. Water resource/env. Eng.	8.7	8.6	8.4	8.8	8.8	8.6
4. Structural engineering	8.5	8.7	8.2	8.8	8.6	8.6
2. Engineering fundamentals	8.6	8.6	8.3	8.9	8.5	8.6
9. Modern engineering tools	8.4	8.7	8.6	8.7	8.2	8.5
3. Geotechnical engineering	8.2	8.4	8.2	8.7	8.8	8.5
1. Basic math & science	8.5	8.1	8.3	8.6	8.1	8.3
11. Cult., soc., env. Awareness	8.3	8.1	8.6	7.9	8.0	8.2
8. Communications	7.7	8.1	8.4	8.1	8.1	8.1
7. Design	8.1	8.1	8.3	8.0	7.5	8.0
5. Transportation engineering	6.7	7.6	8.2	7.3	7.9	7.5

(sorted)

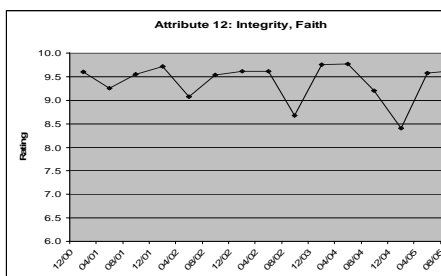
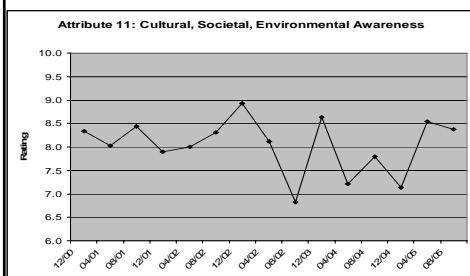
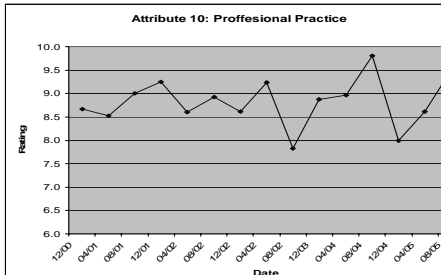
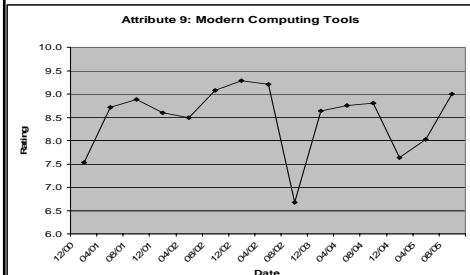
Exit Interview Trends (1-4)



Exit Interview Trends (5-8)



Exit Interview Trends (9-12)



Student Evaluations

- Participation good
- Faculty response/evaluation good
- Working kinks out of database archival

Student Evaluation Data

Student Evaluation Class Records Admin

Add new record		Home				
Edit	Delete	Year	Semester	Course	Section/Instructor	Weakness/Plans for Change
		12	2004	Fall	CE En 270 1 Jones, Norman L.	N Based on feedback from the students, I have decided to change my lecture style slightly. Instead of having them watch me write some VB code and then redo it themselves, I intend to use the projector at the front of the class and let them follow along w/it
		13	2004	Fall	CE En 103 1 Christiansen, Henry N.	N
		14	2004	Fall	CE En 112 1 Shultz, Grant G.	N
		15	2004	Fall	CE En 112 1 Nelson, G. James	N
		16	2004	Fall	CE En 203 1 Christiansen, Henry N.	N
		17	2004	Fall	CE En 305 1 Guthrie, W. Spencer	N
		18	2004	Fall	CE En 321 1 Balling, Richard J.	N
		19	2004	Fall	CE En 332 1 Merritt, Lavene B.	N
		20	2004	Fall	CE En 361 1 Ballo, Mitsuru	Y Actually, I changed textbooks. As it turned out the new textbook had a lot of typos both in the text and in the solution manual, which frustrated students and TAs. Also, since I needed to develop new lecture notes and PP presentation files, and update the
		21	2004	Fall	CE En 424 1 Fonseca, Fernando S.	N
		22	2004	Fall	CE En 433 1 Miller, A. Woodruff	N I don't see any serious weaknesses, but I will give the students more on pumps and turbines (2.6-6) and discuss lab experiments more (2.6.7)
		24	2004	Fall	CE En 470 1 Lucas, Warren Jr.	N
		25	2004	Fall	CE En 204 1 Christiansen, Henry N.	N
		26	2004	Fall	CE En 341 1 Rollins, Kyle M.	N We could improve the class by producing our own lab manual that better matches what we actually do in the lab sections. The existing lab manuals are expensive for the student and not always directly applicable.
		27	2004	Fall	CE En Seminar 1 Borup, Brett M.	N
		28	2005	Winter	CE En 270 1 Jones, Norman	N
		29	2005	Winter	CE En 305 1 Jensen, David W.	N
		30	2005	Winter	Rail C 431-432 1 Bentsley, Steven E.	N
		31	2005	Winter	CE En 321 1 Balling, Richard J.	N
		32	2005	Winter	CE En 424 1 Fonseca, Fernando S.	N
		33	2005	Winter	CE En 332 1 Merritt, Lavene B.	N
		34	2005	Winter	CE En 341 1 Barber, Travis M.	N Although there was no perceived weaknesses, I note that the exam scores may appear to be low however, this is mainly due to a large number of more challenging questions and strict grading rather than lower competencies.
		35	2005	Winter	CE En 431 1 Miller, A. Woodruff	Y This comment is actually not about a weakness, but about a mistake that exists. The competency 6.1.3 should not be on this course list, but it should be on the CEEn 433 list. This has now been

<http://www.et.byu.edu/groups/civilabel/database/index.htm>

Student Evaluations - Summary

Scores																	
Attribute	F01	W02	Sp02	Su02	F02	W03	Sp03	Su03	F03	W04	Sp04	Su04	F04	W05	Sp05	Su05	Mean
1. Basic math & science	78.6	86.3			83.5	81.1	84.9		79.6		79.2			79.7			81.6
2. Engineering fundamentals	80.8	78.7	76.0	80.0	82.6	83.5	82.2	80.4	83.5	82.3	84.9	82.6	83.7	81.5	70.0		82.0
3. Geotechnical engineering	87.0	85.1			79.2	84.6			90.1	75.5			87.6	80.0			83.8
4. Structural engineering	89.7	85.0			88.3	89.5			91.7	88.0			90.7	91.3			89.3
5. Transportation engineering	79.4	67.8	81.5		76.6		78.8		76.0		86.6		74.6		82.2		76.7
6. Water resource/env. Eng.	91.0	84.8	84.3			81.8	96.0	81.9		84.0	85.8	95.0		79.9			83.0
7. Design	79.8	85.1	78.6		81.1	78.6	78.5		80.8	81.5	72.9		78.3	74.0	83.0		79.7
8. Communications	74.0	75.7			74.5	81.5			80.4	75.9			74.0	73.0			75.6
9. Modern engineering tools	83.3	93.5	84.2		83.0	87.9	82.2		86.7	88.6			82.6	91.0	82.5		85.2
10. Professional practice	80.0	75.2			78.8				72.1	77.1			74.5	76.8			76.1
11. Cult., soc., env. Awareness	79.4	75.1			83.2				76.4	80.0			74.0	80.6			77.5
12. Integrity, faith	87.2	77.0			86.4				75.6	80.3			76.2	87.2			81.4

Yearly Results (by academic year)

Attribute	01-02	02-03	03-04	04-05	Mean
1. Basic math & science	85.6	82.6	79.4	79.7	81.8
2. Engineering fundamentals	79.4	82.6	83.0	82.6	81.9
3. Geotechnical engineering	86.1	83.2	82.6	83.2	83.8
4. Structural engineering	87.8	88.8	89.8	90.9	89.3
5. Transportation engineering	72.6	77.4	78.3	77.1	76.3
6. Water resource/env. Eng.	85.3	82.1	84.7	79.9	83.0
7. Design	82.0	80.1	79.9	77.0	79.7
8. Communications	74.7	77.0	78.3	73.3	75.8
9. Modern engineering tools	85.5	84.1	87.1	84.3	85.3
10. Professional practice	77.8	78.8	74.7	75.1	76.6
11. Cult., soc., env. Awareness	77.4	83.2	78.3	75.3	78.5
12. Integrity, faith	83.2	86.4	78.1	80.8	82.1

Yearly Results (by academic year)

Attribute	01-02	02-03	03-04	04-05	Mean
4. Structural engineering	87.8	88.8	89.8	90.9	89.3
9. Modern engineering tools	85.5	84.1	87.1	84.3	85.3
3. Geotechnical engineering	86.1	83.2	82.6	83.2	83.8
6. Water resource/env. Eng.	85.3	82.1	84.7	79.9	83.0
12. Integrity, faith	83.2	86.4	78.1	80.8	82.1
2. Engineering fundamentals	79.4	82.6	83.0	82.6	81.9
1. Basic math & science	85.6	82.6	79.4	79.7	81.8
7. Design	82.0	80.1	79.9	77.0	79.7
11. Cult., soc., env. Awareness	77.4	83.2	78.3	75.3	78.5
10. Professional practice	77.8	78.8	74.7	75.1	76.6
5. Transportation engineering	72.6	77.4	78.3	77.1	76.3
8. Communications	74.7	77.0	78.3	73.3	75.8

(sorted)

FE Exam

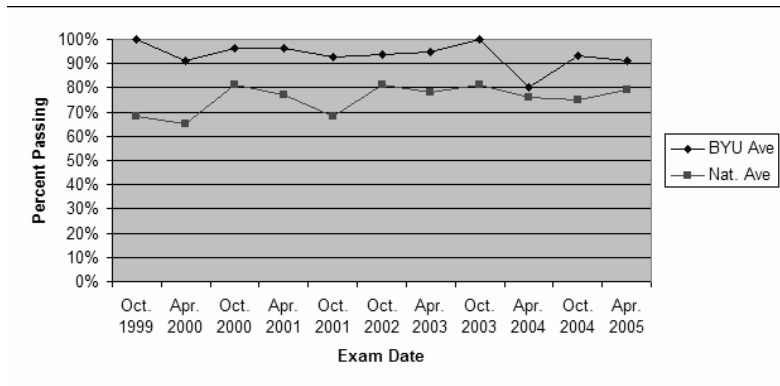
FE Exam Results - Percent Passing

CE En Dept. - Brigham Young University

		# Taking	# Passing	% Passing
Oct. 1999	BYU	40	40	100%
	Nat'l	2410	1645	68%
Apr. 2000	BYU	23	21	91%
	Nat'l	3224	2104	65%
Oct. 2000	BYU	28	27	96%
	Nat'l	1587	1286	81%
Apr. 2001	BYU	29	28	97%
	Nat'l	2337	1801	77%
Oct. 2001	BYU	53	49	92%
	Nat'l	2789	1910	68%
Apr. 2002	BYU	27	25	93%
	Nat'l	2541	2019	79%
Oct. 2002	BYU	34	32	94%
	Nat'l	1688	1369	81%
Apr. 2003	BYU	21	20	95%
	Nat'l	2530	1980	78%
Oct. 2003	BYU	27	27	100%
	Nat'l	1684	1364	81%
Apr. 2004	BYU	25	20	80%
	Nat'l	2808	2139	76%
Oct. 2004	BYU	27	25	93%
	Nat'l	1809	1354	75%
Apr. 2005	BYU	23	21	91%
	Nat'l	3045	2478	79%

FE Exam Trends

	Oct. 1999	Apr. 2000	Oct. 2000	Apr. 2001	Oct. 2001	Oct. 2002	Apr. 2003	Oct. 2003	Apr. 2004	Oct. 2004	Apr. 2005
BYU	100%	91%	96%	97%	92%	94%	95%	100%	80%	93%	91%
National	68%	65%	81%	77%	68%	81%	78%	81%	76%	75%	79%



FE Results by Topic

FE Exam Results - Overall Summary

CE En Dept. - Brigham Young University

Category	Attribute	10-99	04-00	10-00	04-01	10-01	04-02	10-02	04-03	10-03	04-04	10-04	04-05	Mean
Chemistry	1	63.0	62.0	65.0	65.0	73.0	68.0	63.0	75.0	64.0	60.0	73.0	65.0	66.3
Computers	9	84.0	64.0	72.0	88.0	77.0	77.0	73.0	55.0	80.0	75.0	80.0	69.0	74.5
Dynamics	2	60.0	45.0	62.0	66.0	56.0	60.0	69.0	65.0	66.0	52.0	59.0	53.0	59.4
Elect. Circuits		42.0	35.0	31.0	45.0	39.0	40.0	31.0	30.0	29.0	25.0	42.0	33.0	36.2
Eng. Economics	7	63.0	66.0	81.0	74.0	73.0	79.0	73.0	58.0	64.0	57.0	74.0	49.0	67.6
Ethics	12	85.0	78.0	89.0	84.0	83.0	67.0	69.0	73.0	71.0	76.0	61.0	67.0	75.3
Fluid Mechanics	2	73.0	67.0	54.0	75.0	67.0	60.0	61.0	57.0	75.0	64.0	71.0	63.0	65.6
Materials	2	73.0	57.0	61.0	66.0	58.0	55.0	69.0	56.0	66.0	57.0	69.0	62.0	62.4
Mathematics	1	66.0	66.0	64.0	65.0	69.0	67.0	70.0	68.0	76.0	67.0	69.0	75.0	68.7
Mechanics	2	65.0	55.0	54.0	75.0	70.0	65.0	68.0	56.0	69.0	59.0	57.0	72.0	63.7
Statics	2	76.0	56.0	67.0	60.0	66.0	68.0	70.0	61.0	63.0	61.0	64.0	72.0	65.3
Thermodynamics		48.0	52.0	53.0	61.0	61.0	55.0	58.0	54.0	54.0	42.0	39.0	45.0	51.8
Const. Mgmt.		87.0	52.0	50.0	31.0	37.0	52.0	40.0	49.0	54.0	53.0	59.0	51.0	51.3
Comp/Num Mthds	9	67.0	76.0	77.0	79.0	63.0	77.0	64.0	56.0	69.0	64.0	44.0	57.0	66.1
Environmental Eng.	6	74.0	54.0	58.0	56.0	73.0	55.0	54.0	75.0	71.0	59.0	57.0	43.0	60.8
Hydric/Hydrolog	6	58.0	43.0	74.0	57.0	67.0	67.0	75.0	64.0	64.0	33.0	54.0	52.0	59.0
Legal/Prof Aspects	10	68.0	81.0	60.0	63.0	67.0	65.0	83.0	84.0	53.0	89.0	84.0	62.0	71.6
Structural Analysis	4	63.0	59.0	57.0	42.0	63.0	54.0	66.0	41.0	64.0	51.0	43.0	56.0	54.8
Structural Design	4.7	43.0	57.0	59.0	48.0	39.0	39.0	39.0	41.0	39.0	51.0	52.0	32.0	44.8
Soil Mech & Found	3	48.0	75.0	43.0	65.0	66.0	37.0	64.0	52.0	66.0	59.0	66.0	64.0	58.8
Surveying	9	65.0	54.0	69.0	44.0	66.0	65.0	51.0	58.0	75.0	49.0	66.0	59.0	60.1
Transportation	5	58.0	60.0	63.0	67.0	68.0	56.0	54.0	51.0	70.0	42.0	70.0	49.0	59.0
Water Treatment	6	55.0	56.0	67.0	53.0	65.0	57.0	58.0	56.0	75.0	62.0	51.0	63.0	59.8
Attribute		10-99	04-00	10-00	04-01	10-01	04-02	10-02	04-03	10-03	04-04	10-04	04-05	Mean
1 Basic math & science		64.5	64.0	64.5	65.0	71.0	67.5	66.5	71.5	71.0	63.5	71.0	70.0	67.5
2 Engineering fundamentals		69.4	56.0	59.6	68.4	63.4	61.6	67.4	58.8	67.8	58.6	64.0	64.4	63.3
3 Geotechnical engineering		48.0	75.0	43.0	65.0	66.0	37.0	64.0	52.0	66.0	59.0	66.0	64.0	58.8
4 Structural engineering		53.0	58.0	57.5	45.0	51.0	46.5	52.0	41.0	51.5	51.0	47.5	44.0	49.8
5 Transportation engineering		58.0	60.0	63.0	67.0	68.0	56.0	54.0	51.0	70.0	42.0	70.0	49.0	59.0
6 Water resource/env. Eng.		62.3	51.0	66.3	55.3	68.3	59.7	62.3	65.0	70.0	51.3	54.0	52.7	59.9
7 Design		53.0	61.5	69.5	61.0	56.0	59.0	56.0	49.5	51.5	54.0	63.0	40.5	56.2
8 Communications		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9 Modern engineering tools		72.0	64.7	72.7	70.3	68.7	73.0	62.7	56.3	74.7	62.7	63.3	61.7	66.9
10 Professional practice		68.0	81.0	60.0	63.0	67.0	65.0	83.0	84.0	53.0	89.0	84.0	62.0	71.6
11 Cult. soc. env. Awareness		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
12 Integrity, faith		85.0	78.0	89.0	84.0	83.0	67.0	69.0	73.0	71.0	76.0	61.0	67.0	75.3

Exam Categories

Category	Outcome	BYU	Nat'l	Diff
Chemistry	1	66	59	7
Computers	9	75	60	15
Dynamics	2	59	56	4
Elect. Circuits		35	40	-5
Eng. Economics	7	68	63	5
Ethics	12	75	71	4
Fluid Mechanics	2	66	57	9
Materials	2	62	54	9
Mathematics	1	69	56	13
Mechanics	2	64	56	7
Statics	2	65	57	9
Thermodynamics		52	43	8
Const. Mgmt.		51	48	3
Comp/Num Mths	9	66	52	14
Environmental Eng.	6	61	55	5
Hydric/Hydrolog	6	59	50	9
Legal/Prof Aspects	10	72	67	5
Structural Analysis	4	55	51	4
Structural Design	4.7	45	45	0
Soil Mech & Found	3	59	51	8
Surveying	9	60	48	12
Transportation	5	59	51	8
Water Treatment	6	60	52	8

Category	Outcome	BYU	Nat'l	Diff
Computers	9	75	60	15
Comp/Num Mths	9	66	52	14
Mathematics	1	69	56	13
Surveying	9	60	48	12
Hydric/Hydrolog	6	59	50	9
Materials	2	62	54	9
Statics	2	65	57	9
Fluid Mechanics	2	66	57	9
Thermodynamics		52	43	8
Transportation	5	59	51	8
Water Treatment	6	60	52	8
Soil Mech & Found	3	59	51	8
Mechanics	2	64	56	7
Chemistry	1	66	59	7
Environmental Eng.	6	61	55	5
Legal/Prof Aspects	10	72	67	5
Eng. Economics	7	68	63	5
Structural Analysis	4	55	51	4
Ethics	12	75	71	4
Dynamics	2	59	56	4
Const. Mgmt.		51	48	3
Structural Design	4.7	45	45	0
Elect. Circuits		35	40	-5

(Sorted)

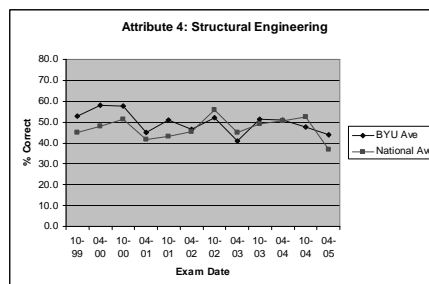
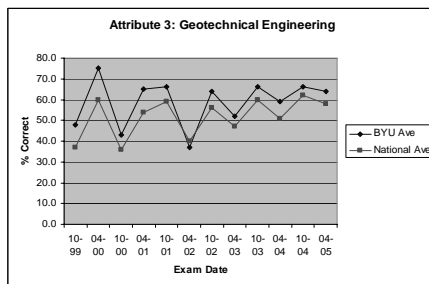
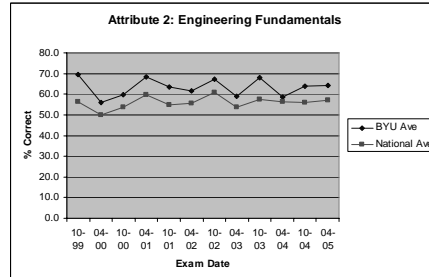
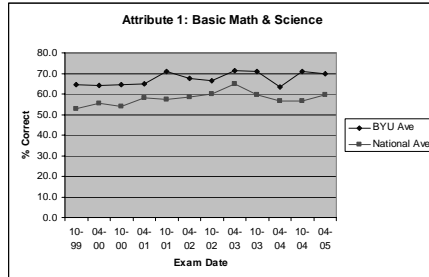
Results by Outcome

Outcome	BYU	Nat'l	Diff
1. Basic math & science	67.5	57.6	9.9
2. Engineering fundamentals	63.3	55.8	7.4
3. Geotechnical engineering	58.8	51.1	7.7
4. Structural engineering	49.8	48.0	1.9
5. Transportation engineering	59.0	50.5	8.5
6. Water resource/env. Eng.	59.9	52.3	7.6
7. Design	56.2	54.0	2.3
8. Communications	n/a	n/a	n/a
9. Modern engineering tools	66.9	53.2	13.7
10. Professional practice	71.6	66.5	5.0
11. Cult., soc., env. Awareness	n/a	n/a	n/a
12. Integrity, faith	75.3	71.2	4.1

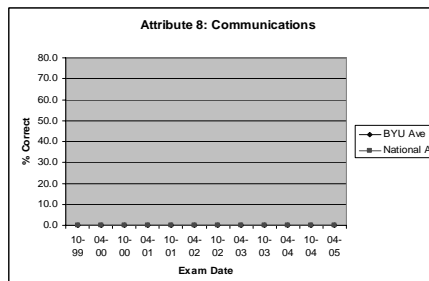
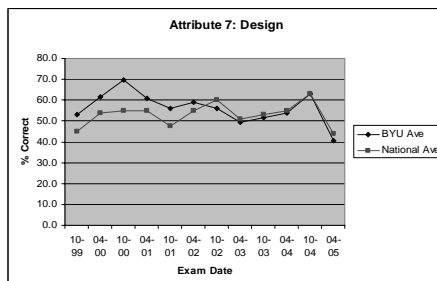
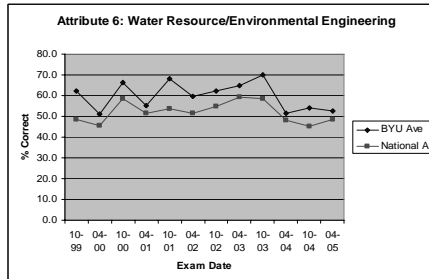
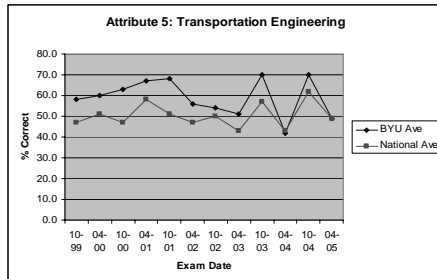
Outcome	BYU	Nat'l	Diff
8. Communications	n/a	n/a	n/a
11. Cult., soc., env. Awareness	n/a	n/a	n/a
9. Modern engineering tools	66.9	53.2	13.7
1. Basic math & science	67.5	57.6	9.9
5. Transportation engineering	59.0	50.5	8.5
3. Geotechnical engineering	58.8	51.1	7.7
6. Water resource/env. Eng.	59.9	52.3	7.6
2. Engineering fundamentals	63.3	55.8	7.4
10. Professional practice	71.6	66.5	5.0
12. Integrity, faith	75.3	71.2	4.1
7. Design	56.2	54.0	2.3
4. Structural engineering	49.8	48.0	1.9

(Sorted)

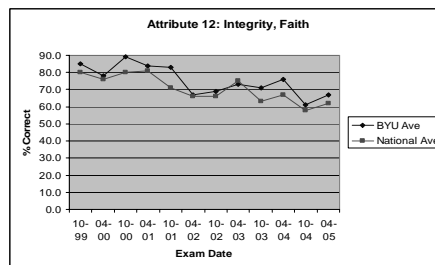
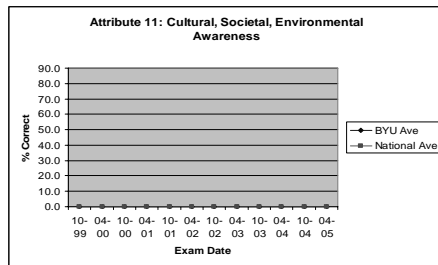
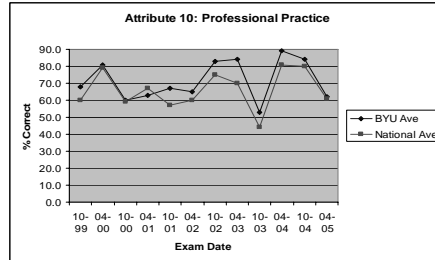
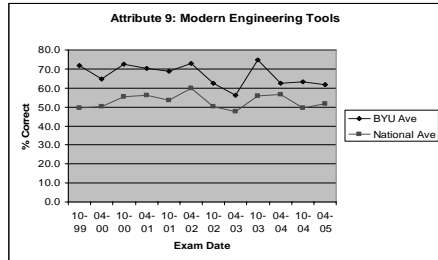
FE Exam Trends (1-4)



FE Exam Trends (5-8)



FE Exam Trends (9-12)



Alumni Survey

- Conducted every three years
- Survey was prepared in Fall 2004 and conducted in Spring 2005
- Sent to alumni gone 3-5 years
- 109 responses (compared to 66 in 2001)

Survey – Grad School

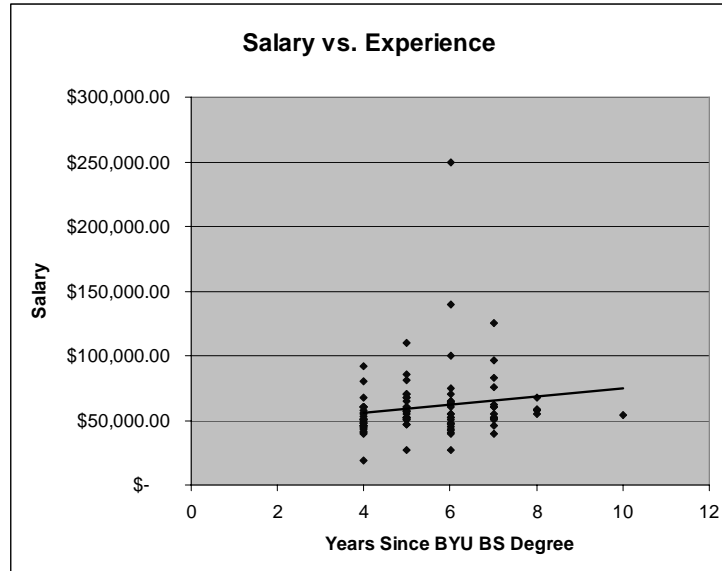
- 65 (60%) completed at least one graduate degree
- 54 (82%) of those getting a second degree, got the degree at BYU
- Four respondents are pursuing a second graduate degree

(see handout)

Survey – Positions & Salaries

- Statistics:
 - Min \$19,000
 - Average \$60,190
 - High \$250,000

Survey – Salary Trends



Survey – Outcomes

Attribute	Preparation	Importance	Prep/Imp	Prep + Imp
1. Math & Science	4.1	3.6	1.14	7.8
2. Fund. Eng. Science	4.3	4.3	0.98	8.6
3. Geotechnical	4.0	3.5	1.16	7.5
4. Structural	3.9	3.6	1.08	7.6
5. Transportation	3.3	2.9	1.14	6.3
6. Water/Env.	4.1	3.7	1.11	7.7
7. Design	4.1	4.6	0.90	8.7
8. Communication	4.1	4.7	0.87	8.7
9. Modern Eng. Tools	4.1	4.2	0.97	8.4
10. Prof. Practice	3.6	4.0	0.91	7.6
11. Cult., Soc., Env. Awareness	3.6	3.4	1.03	7.0
12. Integrity/Faith	4.8	4.5	1.06	9.3

Min:	3.3	2.9	0.87	6.3
Ave:	4.0	3.9	1.03	7.9
Max:	4.8	4.7	1.16	9.3

Sorted by Preparation

Attribute	Preparation	Importance	Prep/Imp	Prep + Imp
12. Integrity/Faith	4.80	4.52	1.06	9.32
2. Fund. Eng. Science	4.25	4.33	0.98	8.58
1. Math & Science	4.14	3.63	1.14	7.77
9. Modern Eng. Tools	4.11	4.24	0.97	8.35
7. Design	4.09	4.57	0.90	8.66
6. Water/Env.	4.07	3.66	1.11	7.73
8. Communication	4.06	4.66	0.87	8.73
3. Geotechnical	4.03	3.48	1.16	7.51
4. Structural	3.94	3.65	1.08	7.59
10. Prof. Practice	3.60	3.97	0.91	7.57
11. Cult., Soc., Env. Awareness	3.56	3.44	1.03	7.00
5. Transportation	3.32	2.93	1.14	6.25

Sorted by Importance

Attribute	Preparation	Importance	Prep/Imp	Prep + Imp
8. Communication	4.06	4.66	0.87	8.73
7. Design	4.09	4.57	0.90	8.66
12. Integrity/Faith	4.80	4.52	1.06	9.32
2. Fund. Eng. Science	4.25	4.33	0.98	8.58
9. Modern Eng. Tools	4.11	4.24	0.97	8.35
10. Prof. Practice	3.60	3.97	0.91	7.57
6. Water/Env.	4.07	3.66	1.11	7.73
4. Structural	3.94	3.65	1.08	7.59
1. Math & Science	4.14	3.63	1.14	7.77
3. Geotechnical	4.03	3.48	1.16	7.51
11. Cult., Soc., Env. Awareness	3.56	3.44	1.03	7.00
5. Transportation	3.32	2.93	1.14	6.25

Sorted by Prep/Imp

Attribute	Preparation	Importance	Prep/Imp	Prep + Imp
3. Geotechnical	4.03	3.48	1.16	7.51
1. Math & Science	4.14	3.63	1.14	7.77
5. Transportation	3.32	2.93	1.14	6.25
6. Water/Env.	4.07	3.66	1.11	7.73
4. Structural	3.94	3.65	1.08	7.59
12. Integrity/Faith	4.80	4.52	1.06	9.32
11. Cult., Soc., Env. Awareness	3.56	3.44	1.03	7.00
2. Fund. Eng. Science	4.25	4.33	0.98	8.58
9. Modern Eng. Tools	4.11	4.24	0.97	8.35
10. Prof. Practice	3.60	3.97	0.91	7.57
7. Design	4.09	4.57	0.90	8.66
8. Communication	4.06	4.66	0.87	8.73

Sorted by Prep+Imp

Attribute	Preparation	Importance	Prep/Imp	Prep + Imp
12. Integrity/Faith	4.80	4.52	1.06	9.32
8. Communication	4.06	4.66	0.87	8.73
7. Design	4.09	4.57	0.90	8.66
2. Fund. Eng. Science	4.25	4.33	0.98	8.58
9. Modern Eng. Tools	4.11	4.24	0.97	8.35
1. Math & Science	4.14	3.63	1.14	7.77
6. Water/Env.	4.07	3.66	1.11	7.73
4. Structural	3.94	3.65	1.08	7.59
10. Prof. Practice	3.60	3.97	0.91	7.57
3. Geotechnical	4.03	3.48	1.16	7.51
11. Cult., Soc., Env. Awareness	3.56	3.44	1.03	7.00
5. Transportation	3.32	2.93	1.14	6.25

Survey – Overall Educational Experience

- After the attribute questions, we asked the following question:
 - “Please rate your overall educational experience in the Civil and Environmental Engineering Dept. at Brigham Young University.” (poor = 1, fair = 2, average = 3, good = 4, excellent = 5).
- All responses were 4 or 5, except for one person who selected 3. The average response was **4.36** (exactly the same as last time)

Survey – Other Major

- Next, we asked the following question:
 - “If you had to do it all over again, would you pick civil and environmental engineering as your major?”
- Of the 109 respondents, 99 (91%) selected yes and 10 (9%) selected no

Curriculum Changes

- Dropped CE En 271
- Added Stats 321
- Modified CE En 470

CE En 271

- Former topics
 - Statistics
 - Engineering economics/finance
- Two Credits
- Problems
 - Too little coverage of statistics
 - Engineering faculty teaching stats

Statistics 321

- Catalog description
 - **321. Elements of Mathematical Statistics.** (3:3:2) F, W, Su Prerequisite: Math 113 or 119 or equivalent.
 - Probability, random variables, frequency distributions, estimation and tests of hypotheses from a theoretical standpoint.
- Three credit hours

CE En 470

- Former content
 - Systems design
 - Optimization
 - Probability/Risk
 - Technical writing
- Problems
 - Poor student evaluations
 - Burden on instructor
 - Not enough professional practice issues

CE En 470 - New

- Design Project
- Engineering Economic Analysis
- Professional Practice

Design Project

- 14 lecture and class discussion periods by *course manager* to
 - introduce the design project, present important elements of civil engineering design
 - explain important aspects of the design that must be considered
 - receive milestone reports associated with the project

Course Manager

- Appointed by Department Chair
- A local professional engineer with significant experience
- Duties
 - Formulate, present and mentor the design project
 - Arrange for the professional practice lectures

Engineering Economic Analysis

- Eight lectures by *full time faculty*
- Will cover basic principles of engineering economic analysis and relate such analysis to the class design experience

Professional Practice

- 6 presentations by local licensed *engineering professionals* addressing issues that accompany and support the assigned design project
- Such issues may include
 - procurement of work
 - bidding versus quality-based selection processes
 - how the design professionals and the construction professions interact to construct a project
 - Sustainability
 - time lines
 - proposal writing
 - etc