University of Colorado Boulder

UNIVERSITY OF COLORADO
CEAE DEPARTMENT
FACULTY MEETING MINUTES

Date	May 15, 2012	**Time**	9:00 AM – 2:00 PM
Facilitator	Keith Molenaar	**Scribe**	Walter Beamer
Location	DLC Collaboratory		
Subject	2012 Spring Planning Retreat		
Attendees	Balaji, Bielefeldt, Chinowsky, Crimaldi, Halek, Hearn, Hernandez, Javernick-Will, Liel, Linden, McCartney, Pak, Pfeffer, Porter, Rajaram, Regueiro, Rosario-Ortiz, Ryan, Saouma, Summers, Vasconez, Xi, Znidarcic		

Key Points discussed

No.	Topic	Highlights
1	2012 Highlights and Challenges	• Keith presented highlights of the 2012 year (ABET, new AREN Degree, renovations, research awards, fundraising, faculty awards) and challenges (enrollments, staff resources, facilities, budget) and opportunities (faculty, new AREN degree, new faculty hire, increasing donor support, college growth). • Please see attached presentation.
2	Explore CVEN/EMEN and AREN/EMEN Dual Degree Opportunities	• The Engineering Management program would like to explore a dual degree option with CVEN and AREN. • Prof. Barbara Lawton presented the benefits of the degree option, which include increased enrollment, closer ties with local industry, and new students. • EMEN and MECH are currently implementing the dual degree program. • The CEAE faculty agreed that the dual degree option should be explored in greater depth. • The CEAE graduate committee will discuss the program in the fall of 2012 and make a presentation about possible implementation for fall of 2013.

3	Department Strategic Roadmap	• Keith Molenaar requested feedback on the one-page CEAE strategic roadmap that the CEAE Executive Advisory Board and faculty developed in 2011 and 2012. • The main questions from the faculty generally arose from the resources needed to achieve the strategic goals and imperatives. • The faculty requested more direction in the prioritization of goals and imperatives in cases when we must make choices in resource investments. • Keith will meet with each of the groups in the fall to gain more input. Keith will also discuss the changes with the Executive Advisory Board in the fall meeting. • The goal is to publish the strategic roadmap as a living document in the fall of 2012. • The roadmap is attached. Comments are welcome and should be directed to Keith.

4	Discuss and Vote on CVEN Curriculum Changes	• Angela Bielefeldt led the discussion on the propose CVEN curriculum changes that were proposed from the Curriculum Committee's work in 2011-2012. • The curriculum changes stem from ABET, college and student feedback. • The overarching goal is to create more flexibility for the students in course choices while concurrently creating more "bandwidth" for faculty teaching. • The proposed curriculum changes are attached. • The faculty discussed the new curriculum at length to better understand the changes in the implications moving forward. • The initial proposal was to include a freshman drawing class OR a geomatics course. An alternative proposal emerged to offer an option a combined geomatics/drawing course rather than an option as initially proposed. • The faculty voted on the attached curriculum with the addition of the combined surveying/GIS option. In addition to the 24 faculty attending the meeting, two votes were sent in prior to the faculty meeting (Corotis and Silverstein). The new curriculum was approved with a majority of faculty in attendance by a vote of: o 20 for o 6 against • It was decided that the new curriculum would be developed in more detail in the fall of 2012 and implemented for incoming freshman in fall 2013.

5	Laboratory Financial Policies and Cost Centers	• John McCartney presented a plan for the development of major equipment cost centers in cases where the equipment is shared by multiple investigators and students. The cost centers are intended to pay for operations and routine maintenance on shared equipment. The use of cost centers is being mandated by the college as condition receiving funds to repair the centrifuge from the college and university in the fall of 2011. • The faculty also discussed the staff support for shared laboratories, primarily the geotech and structures labs. • John's presentation and the proposed guidelines for the cost centers are attached. • There was general agreement for the need for major equipment cost centers and their implementation. The geotech group will implement a cost center approach for the research centrifuges as a pilot. John will report back to the faculty in the fall of 2012 with an update. • This issue of staffing for the labs was not resolved. The issue will be addressed by the groups and ExCom in the summer and fall of 2012.

Civil, Environmental and Architectural Engineering
Spring 2012 Planning Meeting

May 15, 2012 – 9 am to 2 pm
DLC Collaboratory

Co-Leaders: Angela Bielefeldt, Gregor Henze *(in absentia)*, John McCartney and Keith Molenaar

Meeting Goals

1. Explore CVEN/EMEN and AREN/EMEN dual degree opportunities
2. Discuss and vote on CVEN curriculum changes
3. Gain input in to department strategic roadmap
4. Discuss laboratory financial policies and cost centers

Agenda

9:00-9:15 – Introduction and meeting goals (Keith)
9:15-9:45 – State-of-the-department (Keith)
9:45-10:00 – CVEN/EMEN and AREN/EMEN Dual Degrees (Paul and Barb)
10:00-11:30 – CVEN Curriculum Changes (Angela)
11:30-12:30 – Strategic Roadmap (Keith)
12:30-2:00 – Lab discussions (John)
2:00 – Adjourn until August!

Key Discussion Items

<u>CVEN Curriculum Changes</u> (Angela)

- Does our current proposal add flexibility and maintain quality for the students?
  - Are we inspiring freshman to stay in CVEN?
  - Will we be better able to attract open enrollment students into CVEN?
- Have we created bandwidth for both faculty and students?

<u>Strategic Roadmap</u> (Keith)

- Does the strategic roadmap reflect the sense of the faculty?
  - Have we simplified our vision while remaining inclusive?
  - Are we stretching far enough with our strategic goals?
  - Are we missing any prerequisites or enablers?

<u>Laboratory Discussions</u> (John)

- Can we create a financially self-staining laboratory structure?
  - What key policies must be in place to ensure sustainable lab functions?
  - What cost centers should be established to ensure sustainable lab functions?
- Should we consider a reduction of physical lab space or should we consider greater department subsidies for the labs?

CEAE Department

Planning Retreat

May 15, 2012

Meeting Goals

- Explore CVEN/EMEN and AREN/EMEN dual degree opportunities
- Discuss and vote on CVEN curriculum changes
- Gain input in to department strategic roadmap
- Discuss laboratory financial policies and cost centers

State-of-the-department

- Just the facts
- Highlights of accomplishments in 2011-12
- Challenges & opportunities
- Discussion

Just the facts

Our department serves ~980 students

- 483 undergraduates (298 CVEN & 185AREN)
- 215 undergraduates in EVEN (~2/3 of SCHs)
- 282 graduate students (197 MS and 85 PhD)

~17,300 SCH – most in the college
MS program – largest in college

Just the facts

44 faculty in our department

- 23 Professors
- 6 Associate Professors
- 10 Assistant Professors
- 3 Senior Instructors
- 2 Research Faculty

17:1 Ugrad/Fac Ratio
7:1 Grad/Fac Ratio
2:1 PhD/Fac Ratio

Four new hires in next two years

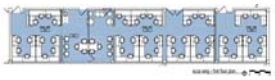
Accomplishments

- ABET Accreditation
- New AREN graduate degrees
- Completion of Academic Program Review
- Major AREN and CVEN curriculum revisions
- Establishment of Rocky Mountain Lighting Academy

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Accomplishments

- Establishment of Executive Advisory Board
- ~6,500 sf of new labs, grad student space & conference rooms
- 4th floor conference room renovation
- Graduate space renovation/addition



Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Accomplishments

- Best Research Year to Date
  - $8.3 million in awards to date ($8.7 is best year)
  - 51 new awards – Karl (5), Amy (5), CDOT (4)
  - 3.7 papers/faculty
  - $197K/faculty in expenditures
  - Exceptional PhD students
    - 6 NSF graduate awards in 2011-12
    - 3 EPA Science To Achieve Results (STAR) awards

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Accomplishments

- Fundraising
  - $200K + from advisory board members
  - $250K to lighting program
  - New Mortenson Director Professorship
  - New Bennet-Linstedt Faculty Fellowship
  - New MBA-CEM Real Estate Faculty Fellowship
  - More than $2.5M in “asks” pending
  - Currently 2nd in family campaign ($8,726)

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Diane McKnight
National Academy
of Engineering

Angela Bielefeldt
BFA Excellence
in Service

Amy Javernick-Will
ENR Top 20
Under 40

Hari Rajaram
President’s Teaching Scholar
BFA Excellence in Teaching

Mathew Hallowell
ASCE New Faculty Excellence in Teaching
Peebles Teaching Award

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Challenges

Unstable Undergraduate Enrollments

Year	AREN	CVEN	Total
2005	221	214	435
2006	257	227	484
2007	277	250	527
2008	273	290	563
2009	248	304	552
2010	205	287	492
2011	185	298	483

AREN Freshman enrollment has decrease drastically
All-time high of **55 in 2006 to 26 in 2011**

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Challenges

- Lack of staff resources
  - 4% funding from 2005 to 2010
  - vs. 300% grant and 27% growth in SCHs
  - Good news 1 new FTE in 2011 (Erin Jerick) and 1 FTE in 2012 (Carrie Olson)

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Challenges

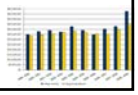
- **Facilities**
  - **Good news – facilities upgrades**
    - $420K Environmental Sustainability Labs
    - $75K Upgrades to graduate offices
    - $30K Graduate student collaboration space

  - **Bad news – facilities repair and maintenance**
    - ~$175K Centrifuge repair and MTS repair
    - ~$30K deficit in Stuctures/Geotech Lab Operations
    - ~$300K needed for Larson Lab Renovation
    - **No maintenance fund for any labs**

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Challenges

- Budget
  - Currently ~$250k deficit
  - ~$250K in renovation/repair in 2011-2012
  - ~ $1.2M in current startup obligations
  - ~ $700K in pending startup obligations
  - Severe reduction in TA budget in 2011 (but not graduate funding budget)

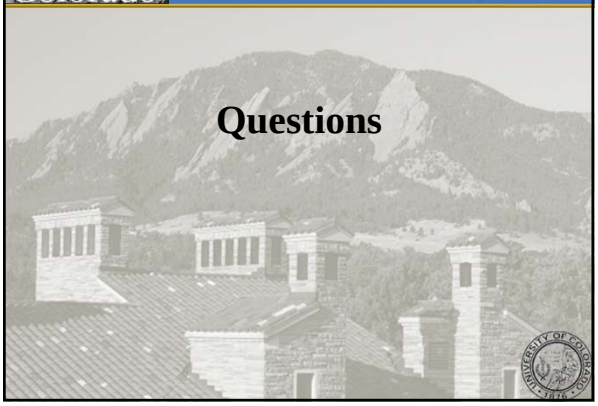


Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE

Opportunities

- Energetic and innovative faculty developing new research and educational programs
- New AREN graduate degree program
- At least 3 new faculty hires in next 2 years
- Increasing donor support
- College is planning to grow enrollment by 30% in next 8 years

Colorado | Department of Civil, Environmental, and Architectural Engineering | CEAE



CEAE Strategic Roadmap – May 15, 2012

Vision

The CEAE department aspires to lead in extraordinary education and research for the sustainable development, management and safety of civil and architectural infrastructure systems – serving society in harmony with our natural resources.

Enablers and Prerequisites			Strategic Goals/Imperatives		
People	**Program**	**Places**	**People**	**Program**	**Places**
▪ Engage in high school recruitment efforts. ▪ Engage in Engineering Honors programs. ▪ Enrich student academic experience through internships, interaction with practicing engineers, service learning and study abroad programs. ▪ Increase fellowship, research and teaching assistantship resources. ▪ Retain current faculty and secure additional tenure track faculty and instructor lines. ▪ Increase staff budget.	▪ Build on successes of Engineers without Boarders and Mortenson Center to increase student quantity and quality. ▪ Implement a formal and self-sustaining undergraduate internship program. ▪ Establish a standing research committee to systematically pursue large collaborative proposals. ▪ Craft partnerships with state agencies, NGOs and industry to broaden our funding base. ▪ Build on funding success with federal research agencies.	▪ Create formal relationships with universities and a CEAE administrative structure to support an international degree designator. ▪ Procure funding to fulfill CEAE building plans. ▪ Identify faculty member to champion second Residential Academic Program.	▪ Enroll 50 AREN and 50 CVEN undergrad students per year with above average quality metrics in the college and among our peers. ▪ Enroll 25 AREN and 50 CVEN grad students per year with above average quality metrics in the college and among our peers. ▪ Increase student scholarships and fellowships by 30%. ▪ Increase faculty by 4 tenure track and 2 instructors. ▪ Endow 5 additional faculty fellowships, professorships or chairs. ▪ Increase staff by 30%.	▪ Promote and develop programs in the spirit of "engineering for a global society." ▪ Establish 3 new research centers in areas that impact local, state, national and global needs. ▪ Enable every student to participate in at least one major enrichment experience (internship, discovery learning, service learning and/or study abroad).	▪ Establish and sustain 3 international research and/or education relationships. ▪ Expand laboratory space for teaching and research programs by 15%. ▪ Enhance the quality of graduate and undergraduate facilities. ▪ Develop a second Residential Academic Program.

Revised CVEN curriculum

Why?

Potential benefits

Proposal: CVEN

May 15, 2012
CEAE Faculty Retreat
On behalf of Curriculum Committee

Need for curriculum change? CU and ABET drivers

- College will be requiring 2-credit GEEN 1500 Intro to Engineering starting in Fall 2013
- Potential new ABET accreditation requirements for CVEN
  - More depth in professional areas….
  - We have more breadth and depth than needed in CVEN sub-discipline areas

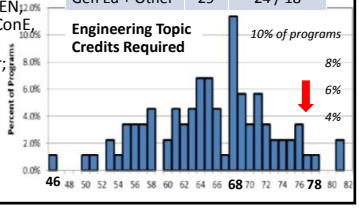
Benefits of Flexible Curriculum

- Attractive to students
  - First Year survey 2011 "what would make your experience in engineering more satisfying" offer more free electives (CVEN #1, 69%; AREN #2, 56%)
  - Senior survey M2010 "rate satisfaction with aspects of curriculum: availability of electives" AREN 3.2 (lowest), CVEN 2.9 (lowest)
- May relieve stress of large class sizes
  - Students take courses of interest
- May reduce breadth of courses that we must teach each year (i.e. concentration courses)

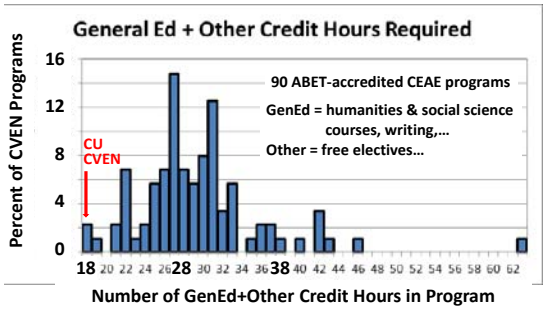
CU curricula vs. CU and U.S. peers

- All CU engineering majors have free electives EXCEPT CVEN
  - 6 to 3 credits: ECEN; ASEN; CHEN, CBEN; EVEN, MCEN
- National peers with more flexible CVEN curriculum
  - ABET accredited 229 CVEN; 64 EVEN, 17 AREN, 11 ConE, 1 StrE
  - 2011 Fridley ASEE paper; survey 90 respondents 82% CVEN, 11% EVEN, 4% AREN, 1% ConE, 1% StrE

Fridley 2011 data	US Avg	CU AREN/CVEN
Total credits	130	128 / 128
Engineering Cr	65	75 / 77
Math/Science	34	32 / 33
General Ed Cr.	25	21 / 18
Gen Ed + Other	29	24 / 18

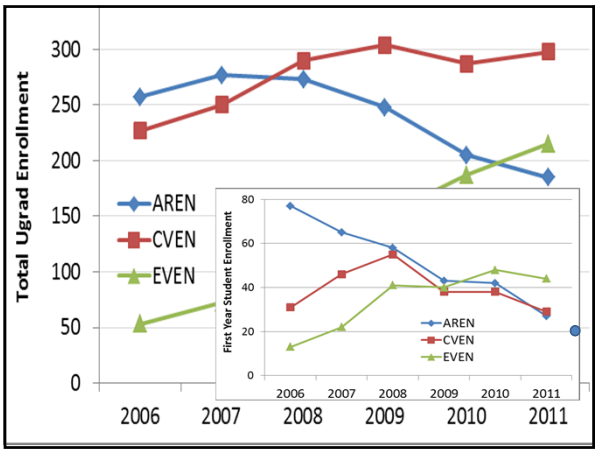


Fridley 2011, US wide survey



"Peer" CVEN curricula

US News 2012 UG rank	University	Total Credits	# Gen Ed + Free credits
1	U Cal - Berkeley	120	27
2	U Illinois – Urbana Champaign	128	31 *inc. 6 cr free electives*
3	Georgia Inst. Technology	126	30 6 approved elective
4	Stanford	120 180Q	45 (67Q)
5	Purdue	135	25
6	U Texas – Austin	125	27-30 (1st yr sig course?)
7	U Michigan – Ann Arbor	128	27 11 general electives
8	MIT	133 20Qunits	37 48u unrestricted electives
9	Cornell U	126	27 6 cr approved e
10	Texas A&M College Station	128	26



CVEN: ABET Program Specific Criteria

Current (2011-2012-2013)

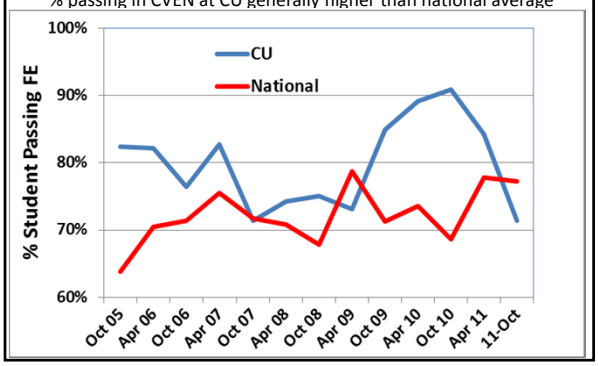
- proficient in math thru diff eqns, calculus-based physics, chemistry, 1 additional area of basic science
- apply knowledge of 4 technical areas appropriate to CVEN
- conduct CVEN experiments and analyze and interpret the resulting data;
- **design** a system, component, or process in **more than 1 CVEN context**
- **explain basic concepts in management, business, public policy, and leadership**
- **explain the importance of professional licensure**

Future?? (JS comments)

- More breadth in BS and depth at MS (per BOK2)
- Bloom's level 3 [occurs in Fundamental level courses]
- **Bloom's level 5**
- **Raise these to Bloom's level 2 (instead of current level 1)**
- **Our ABET concern**

Assessment: FE Exam

% passing in CVEN at CU generally higher than national average



Fall 2010-Spring 2011

Assessment: CVEN Senior Survey

- Rate outcomes on scale of 1 to 5 for how well CU engineering education equipped you in following areas:
  - **Above 3.5 OK (3=moderately, 4=very well) for all except:**
    - Ability to think creatively 3.47 (not a program outcome)
    - **Understanding of current events and contemporary issues 3.27 (ABET J/CU 12)**
    - Understanding of technical codes, practices & standards 3.45
    - **Ability to explain basic concepts in management, business, public policy, and leadership 3.22**
  - ***proposed new 2-credit course in Professional Issues***

Professional Issues (2 cr)

- Learning goals:
  - Explain the importance of **professional licensure** and the path to become a licensed PE (ABET concern)
  - Prepare for the FE exam (maintain acceptable performance)
  - Explain the key aspects of **project management** (BOK LOA 2; ABET CVEN)
  - Describe key information related to **public policy**; Discuss and explain key concepts and processes involved in public policy (BOK LOA2)
  - Explain key concepts and processes used in **business & public administration** (BOK LOA2)
  - Define & explain **leadership**, the role of a leader, and leadership principles and attitudes (BOK LOA2; ABET CVEN criteria)
  - Define and explain key properties of **sustainability** as they pertain to civil engineering works (BOK LOA2)
  - **Current events and contemporary issues** (ABET J)

Spring 2012 Env/Water JEC

- Positive feedback on proposed curriculum change
  - "The JEC believes that this increased flexibility will make Civil Engineering more attractive to some students who view the current requirements as too rigid. Further, the JEC feels that it is important that students be encouraged to broaden their university learning experience beyond the "four walls of the Engineering Center". Increasing the number of free electives should move in that direction."

CVEN Proposal

- Drawing **OR** Geomatics
- Remove:
  - Transportation
  - 3 vs 4 proficiencies
  - No req'd conc
- 2 cr Prof Issues
- 12 cr. Tech electives
- 6 cr. free electives
- Plan was popular with 2012 Env/Water JEC
  - Liked that students could select breadth or depth

Discussion? Vote?

8TH SEM	17	CVEN Professional Issues - 2	Tech Elective-3	Tech Elective-3	PROFICIENCY 2 – 3 credits	FREE ELECTIVE 3 credits	3 UD S-H Elective
7TH SEM	16	CVEN 4899-4 Sr Design Proj #	Tech Elective-3	Tech Elective-3	PROFICIENCY 3 – 3 credits		3 UD S-H Elective
6TH SEM	15	CVEN 3227-3 Prob & Statistic #	CVEN 3111-3 Analytical Mech II		PROFICIENCY 1 – 3 credits	FREE ELECTIVE 3 credits	WRTG 3030 -3
5TH SEM	18	FUND 1 CVEN 3246-3 Intro. Construct	FUND 2 CVEN 3323-3 Hydraulic Eng #	FUND 3 CVEN 3525-3 Struct Analysis	FUND 4 CVEN 3414-3 Fund. of Env. Eng	FUND5 CVEN 3708-3 Geotech Eng I	3 S-H Elective
4TH SEM	16	APPM 2360-4	CVEN 3313-3#	CVEN 3161-3	AREN 2110-3		3 S-H Elective
3RD SEM	15	APPM 2350-4	PHYS 1120-4 1140-1	CVEN 2121-3		CVEN 3698-3 *OR basic science*	
2ND SEM	17	APPM 1360-4	PHYS 1110-4	GEEN 1300-3		Drawing geomatics combo	3 S-H Elective
1ST SEM	14	APPM 1350-4	CHEN 1211-3	CHEM 1221-2	GEEN 1400/10 -3	GEEN 1500-2 Intro to Engrg#	

CVEN Proposal

- Geomatics
- Remove:
  - Drawing (could be free elective)
  - Transportation
  - 3 vs 4 proficiencies
  - No req'd conc
- 2 cr Prof Issues
- 12 cr. Tech electives
- 6 cr. free electives
- Plan was popular with 2012 Env/Water JEC
  - Liked that students could select breadth or depth

Discussion? Vote?

8TH SEM	17	CVEN Professional Issues – 2 #	Tech Elective-3	Tech Elective-3	PROFICIENCY 2 – 3 credits	FREE ELECTIVE 3 credits	3 UD S-H Elective
7TH SEM	16	CVEN 4899-4 Sr Design Proj #	Tech Elective-3	Tech Elective-3	PROFICIENCY 3 – 3 credits		3 UD S-H Elective
6TH SEM	15	CVEN 3227-3 Prob & Statistic #	CVEN 3111-3 Analytical Mech II #		PROFICIENCY 1 – 3 credits	FREE ELECTIVE 3 credits	WRTG 3030 -3
5TH SEM	18	FUND 1 CVEN 3246-3 Intro. Construct	FUND 2 CVEN 3323-3 Hydraulic Eng #	FUND 3 CVEN 3525-3 Struct Analysis	FUND 4 CVEN 3414-3 Fund. of Env. Eng	FUND5 CVEN 3708-3 Geotech Eng I	3 S-H Elective
4TH SEM	16	APPM 2360-4	CVEN 3313-3#	CVEN 3161-3	AREN 2110-3		3 S-H Elective
3RD SEM	15	APPM 2350-4 Calc 3	PHYS 1120-4 1140-1	CVEN 2121-3		CVEN 3698-3 # *OR basic science*	
2ND SEM	17	APPM 1360-4 Calc 2	PHYS 1110-4	GEEN 1300-3 Comput		CVEN 2012 -3 Geomatics #	3 S-H Elective
1ST SEM	14	APPM 1350-4 Calc 1	CHEN 1211-3	CHEM 1221-2	GEEN 1400/10 -Projects	GEEN 1500-2 Intro to Engrg#	

Keith's comments

- Credit balancing?
  - Don't like 18-credit semesters
- Preferred students have both drawing (with test-out option) and geomatics
  - Student credit hours
- Unsure about computing in first year

+ = attract OPEN, - our course more interesting to students

sem	CV now	CV new	AR old	AR new	MC now	EV now	CH Now
1	16	14	16	14	16	16	15
2	17	17	17	17	17	17	15
3	**18**	15	17	17	15	15	17
4	16	16	16	16	16	16	**18**
5	15	**18**	15	15	15	16	16
6	15	15	15	15	17	15	17
7	15	16	15	17	17	**18**	15
8	16	17	17	17	15	15	15

References

- Berkeley: http://www.ce.berkeley.edu/system/files/assets/aao/FourYearDegree_F10_wwn_0.pdf
- http://provost.illinois.edu/ProgramsOfStudy/2012/fall/programs/undergrad/engin/civil.html
  - CAD
- http://www.catalog.gatech.edu/colleges/coe/ce/ugrad/bsce/bsce.php
  - CAD
- http://www.stanford.edu/group/ughb/2011-12/CE_1112_PS_Dry.pdf
- http://www.stanford.edu/group/ughb/2011-12/CE_1112_PS_Wet.pdf
- https://engineering.purdue.edu/CE/Academics/Undergraduate/PlanStudy/Curriculum-Flowchart-General.pdf
  - 4 cr geomatics, 2 cr CAD
- http://www.ce.utexas.edu/current-students/undergraduate/civil/curriculum/C%20E%2010-12%20Degree%20Plan.pdf
  - 2 cr CAD
- http://www.cee.umich.edu/sites/webservices.itcs.umich.edu.drupal.umcee/files/images/SampleScheduleTableFall11Beyond.pdf
- http://cee.mit.edu/undergraduate/1C-degreerequirements
- http://www.cee.cornell.edu/academics/loader.cfm?csModule=security/getfile&PageID=68160
- https://www.civil.tamu.edu/downloads/UgradInfo/CVEN_Degree_Plan_Catalog_134.pdf

Colorado University of Colorado at Boulder | Department of Civil, Environmental and Architectural Engineering | CEAE | Geotechnical Engineering Group

2012 CEAE Faculty Retreat

Laboratory Policy Discussion

John McCartney
May 15th, 2012

CEAE Laboratories

- Structural Engineering and Structural Mechanics
  - Structural laboratory (FHT)
  - Materials laboratory
  - Concrete laboratory/machine shop

Focus: Large, Shared Facilities

- Geotechnical Engineering and Geomechanics
  - Undergraduate laboratory
  - Centrifuge Center
  - Graduate laboratory and flow processes lab
- Environmental (Undergrad/Individual faculty labs)
- Water (Flume lab)
- Building Systems (Larson lab)

Geotech/Structures Laboratory Successes

- Shared facilities are part of the identity of our department
- Long history of successful projects and contributions to engineering science
- Several ongoing projects in structures and geotechnical laboratories
  - ORPC – TidGen Foundation Evaluation
  - LADWP – Seismic Effects on Buried Reservoirs
  - MURI – Blast Testing
  - NSF - Energy Foundations
  - VESTAS – Wind Turbine Safety Evaluation
- Important to undergraduate and graduate courses

Geotechnical/Structures Lab Courses

- CVEN 3161 (F/Sp) – 80 to 100 students
- CVEN 3708 (F/Sp) – 50 to 80 students
- CVEN 3718 (F/Sp) – 25 to 80 students
- CVEN 4161 (Sp) – 20 to 40 students
- CVEN 7718 (Sp) – 20 students
- Graduate and undergraduates who pay their own tuition to perform experimental research as part of their degrees

Challenges in SHARED Laboratory Operations

- Heavy burden on few number of faculty
  - No established policies or enforcement mechanisms
  - No sustained funding sources
- Technical staff
  - Benefits
    - Institutional knowledge
    - Provides routine research assistance and maintenance
    - Enforcement of safety and operational protocols
  - Costs
    - Must be managed/mentored actively by a faculty member (can't have multiple bosses)
    - Costs should be balanced by quality of desired services
    - Lack of a safety net in case technical staff leave
      - Archived operational procedures, manuals
      - Inventory and calibrations of shared equipment

Challenges in SHARED Laboratory Operations

- Maintenance
  - Needed to avoid major repairs
  - Prioritization requires active management by faculty
- Contracting for auxiliary account work
  - Contract templates (if external agency permits their own contract not to be used)
  - Procedures for signing contract documents
  - Invoices
- Operations
  - No procedures for collection of income from faculty
  - Currently based on the honor system

Ideal Operations: Goal

- Ideal technical management
  - Faculty leader works with individual faculty researchers to identify project needs and constraints to create a plan to set the project on the desired path
  - Individual faculty (or outside users) are responsible for the quality of the outcomes of their experimental research
  - Technical assistance, troubleshooting, and institutional knowledge are provided by laboratory staff
  - Well-operating equipment is available and organized into an inventory, with records of calibration, wiring diagrams, capacities
- Ideal funding pattern
  - Department covers educational component
  - Projects cover research component in a self-sustaining manner
  - Mechanism for backstopping laboratory costs in lean times

Cost Center Overview

- Requested by the dean's office and university
- What is included:
  - A maximum hourly rate which can be charged in federally supported projects
  - Non-profit, centralized accounts into which funds can be transferred and saved for maintenance/staff support
- What is not included:
  - Guarantee of project success – depends on faculty
  - Identification or prediction of the number of hours a project will require from the beginning
  - Flexibility in dealing with problems inevitable in experimental research

Proposed Cost Centers

- 4 proposed centers:
  - General structures/geotechnical laboratory
  - Geotechnical centrifuge center
  - Fast hybrid testing facility and large-scale shaker
  - MTS load frames
- 2 cost structures proposed for each:
  - Basic
  - Advanced

Basic Cost Structure

- The basic cost structure incorporates use of the equipment and instrumentation
- All research activities in the basic cost structure are performed by personnel funded by a project
- In the case of the geotechnical centrifuge and fast hybrid system, the laboratory staff will operate the equipment
- Routine maintenance and safety checks by the laboratory staff are included

Advanced Cost Structure

- The advanced cost structure incorporates use of the equipment and instrumentation, with more in-depth assistance from the laboratory staff
- Laboratory staff may assist in data acquisition setup, calibration activities, and experimental troubleshooting
- Project-funded employees are still responsible for assembling the experimental setup and connecting instrumentation to the data acquisition system, and to operate the equipment if properly certified
- Routine maintenance and safety checks by the laboratory staff are included

Justification Behind Cost Structures

- Approximate baseline costs to cover
  - $60,000 per year for Nate Bailey's salary
  - $30,000 per year for maintenance for all labs
- Basic
  - Assuming that this will be the most commonly used cost structure by faculty internally, it should be configured to cover the baseline costs
  - Rates and estimates of maximum hours defined to reach the baseline costs for all labs
- Advanced
  - Assuming that this will primarily be used for outside users (Sierra Nevada, ORPC, etc.), this should include more funds for technical staff support and troublshooting
  - Rates based on historical charges (e.g., $1000/day for centrifuge)

General Laboratory Cost Center

- Includes:
  - Staff time for administration, maintenance, cleanup and safety
  - Small tools and machining equipment (mill, drill press, saws)
- Costs
  - Basic: $0/hr (2000 hrs expected)
    - NOTE: This implies that the departmental subsidy of $30,000 covers the basic cost of the general laboratory usage for faculty and student use
  - Advanced: $15/hr (2000 hrs expected)

Geotechnical Centrifuge Center

- Includes:
  - 400 g-ton centrifuge
  - 15 g-ton centrifuge
  - Shake table and MTS hydraulic pump
  - Associated instrumentation, loading motors and data acquisition system
  - Basic supplies (hydraulic oil, gearbox oil), tools, and equipment (crane)
- Costs:
  - Basic: $43.35/hr (630 hrs expected)
  - Advanced: $125.15/hr (630 hrs expected)

Fast Hybrid Center

- Includes:
  - 4 MTS 22kip actuators
  - 2 MTS 100kip actuators
  - 1 MTS 220kip actuator
  - MTS shake table, 5ft x 5ft
  - Silentflo pumps
  - Associated instrumentation and DAQ
  - Basic supplies (hydraulic oil), tools, and equipment (crane, forklift, etc)
- Costs:
  - Basic: $43.35/hr (630 hrs expected)
  - Advanced: $141.87/hr (630 hrs expected)

MTS Load Frame Center

- Includes:
  - 1 MTS 1000kip load frame
  - 2 MTS 110kip load frames
  - 2 MTS 70gal/min pumps
  - 1 MTS 20gal/min pump
  - Environmental chamber
  - Associated instrumentation and DAQ
  - Basic supplies (hydraulic oil), tools, and equipment (crane, forklift, etc)
- Costs:
  - Basic: $24.85/hr (1000 hrs expected)
  - Advanced: $76.39/hr (1000 hrs expected)

Issues

- Establishing cost centers will not lead to quality alone
- How to define the number of hours for a project?
- Need to reduce costs where possible
  - Potentially pay technical staff from the general account to reduce overhead costs
  - Clarify how overhead is charged when transferring funds into the service center
- Need to set priorities and build in buffers for delays
  - Instructional usage for classes
  - Sponsored research projects (federal and state, private sector)
  - Unsponsored research projects (faculty, students)
- Backstopping of laboratory costs by the department
  - Operations often require jobs to be finished before invoicing

Future Outlook

- The geotechnical/structures major facilities will likely go into further debt before becoming sustainable
- Policy for including laboratory costs into experimental proposals is a priority
- Hire new faculty with experimental expertise
- Actively seek “consulting” type work from industry (?)
- Identify large “center” proposals
- Seek donations to cover the baseline costs of the laboratory (name the laboratories)
- Reduce laboratory staff support and use students or “on-call” outside engineers to fill their role