CEAS 2019

*CEAS Vision: To be the national choice for engineering education and a world leader in knowledge creation*

February 3\textsuperscript{rd}, 2011
The Last Three Years

We’ve been asked to meet these challenges:

– Collegiate restructuring which included formation of CEAS through merger of College of Engineering and College of Applied Science

– Planning / Implementation of Semester Conversion

– Budget Cuts
  FY’10 ($2.4M); FY’11 ($2.2M);

– Problems with student retention and teaching basic courses
How We are Meeting These Challenges

• Formation of Schools
• Creation of School of Engineering Education
• Design, planning and construction for Alumni Learning Center
• Issues such as workload and performance are being addressed.
New Challenges

• Loss of common core of the curriculum during the semester conversion process

• Expected FY’12 budget cut of $4.9M
Context of Current Fiscal Challenge

- Total CEAS General Funds: $24M
- Total CEAS budget in General Funds for all permanent staff (excludes deans and faculty): $4.1M
- Total additional CEAS operating budget (non-salary) in General Funds: $930K

The 20% cut of $4.9M represents the total CEAS budget for staff and operations.
• Clearly, we cannot absorb this cut with traditional across the board budget cuts.

• How do we make dramatic changes while maintaining academic integrity?
Comparing UC to the Middle 50% of the Top Institutions

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Note: 2007-2008 data from the National Center for Educational Statistics
* 25th to 75th Percentile for incoming freshmen offered admission in 11A

38.7% of CEAS incoming freshmen offered admission in engineering programs for 11A have an ACT of 30 or above

Average 05A : 26.9
Average 10A : 27.7
Average 11A offers: 28.6
How do we remain true to our mission to provide our high quality students with excellence in scholarship and absorb this cut in the face of diminishing resources?

Goals:

• Provide a world-class educational experience for our students
• Be a destination institution attracting the best students in the world to come here to work and learn
• Retain the top students
• Be a leader in knowledge creation

➤ How do we achieve these goals?
Barriers to Achievement

- Quality and type of academic programs
- Bridging basic engineering science and applications
- Difficulty in recruiting high-caliber students
- Improving quality of MS & PhD students
Actions for the Development of the CEAS Strategy

- From January 3 to 31, Dean Montemagno met with numerous small groups of faculty representing 60% of total CEAS faculty
- January 3: Presented to School Directors
- January 6: Presented to Dean’s Advisory Council
- February 2: Presented to CEAS Tribunal Officers

- Faculty Committees include:
  - Co-op 3.0 (4 years education with 3 co-op sections) issued report in November after meeting regularly through the Fall (Engineering Honors Plus Program)
  - Ad Hoc Integrated Engineering Program with at least one faculty member from each School began meeting in December
  - SEEBME Committee
  - CSI Committee
  - Engineering Technology Committee
Resource Challenges in Our Academic Program

• Ninety upper level technical courses were taught in CEAS in 2009-10 spread over 17 majors (~5 electives/major).

• Since 05A, we have 14.9% more students and 18.5% less classes.

• 46% of FTEs taught in CAS in 2009-10 were by adjunct instructors.

• 14% of our best students (those freshmen receiving an A or B in calculus) leave the college each year.

The quality of our program has not kept pace with the quality of our students!!!!
Program Quality Issues
Input from Alumni and Industry

• First 3 to 4 quarters of their education at the college was not effective in connecting engineering theory with application
• Core engineering curriculum has been static
• Difficulty in Knowledge Synthesizing
• Deficiency in Critical Thinking Skills
How does CEAS Manage Resources to Achieve our Vision

- Quality and type of academic programs
  - Program realignments
- Bridging basic engineering science and applications
- Difficulty in recruiting high-caliber students
- Improving quality of MS & PhD students
Rationale for Program Realignments

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<tr>
<th></th>
<th>OSU</th>
<th>UCLA</th>
<th>University of Pittsburgh</th>
<th>Michigan State University</th>
<th>West Virginia University</th>
<th>Rutgers University</th>
<th>University of Wisconsin Madison</th>
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<th>CEAS 2016</th>
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<td>BS Headcount</td>
<td>5617</td>
<td>3205</td>
<td>2104</td>
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<td>UG Programs Offered</td>
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<td>Annual Research / Faculty ($K)</td>
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<td>597</td>
<td>250</td>
<td>217</td>
<td>341</td>
<td>645</td>
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N.B.: Data for OSU, UCLA, University of Wisconsin-Madison, University of Pittsburgh, Michigan State University, West Virginia University and Rutgers University are from ASEE’s *Profiles of Engineering and Engineering Technology Colleges*, 2009.
Leveraging Our Strengths

- Biological and Biomedical Engineering
- Chemical Engineering
- Sustainable Engineering

- Aerospace Engineering
- Engineering Technologies
- Mechanical Engineering
- Civil Engineering
- Electrical Engineering
- Construction Management
- Architectural Engineering
- Computer Engineering

Core Undergraduate Programs
Unique Strengths and Synergistic Relationships
How does CEAS Manage Resources to Achieve our Vision

• Program realignments
• Bridging basic engineering science and applications
  • Integrated Engineering
• Difficulty in recruiting high-caliber students
• Improving quality of MS & PhD students
Focus on Improving Quality of Academic Programs

- We will redesign our entire undergraduate curriculum to meet our students’ needs for the current century:
  - First 3 semesters should be common
  - Physics, Math and Chemistry concepts need to be integrated into the CEAS curricula
  - Focus on providing a core toolbox of engineering skills that our graduates can use throughout their careers
Integrated Engineering

• Introduce new integrated College-level curriculum
  • Emphasize connections between engineering science and the practice of engineering
  • Educational model that enables cost-effective high quality educational experiences
  • Emphasize active vs passive learning
  • An in-depth curriculum that is challenging and attractive to the best students in the country!
  • Focused retention vehicle
  • Tailor-made to integrate into experiential learning
  • Conversations with A&S need to occur
How does CEAS Manage Resources to Achieve our Vision

- Program realignments
- Integrated Engineering
- Difficulty in recruiting high-caliber students
  - Improve quality of freshmen and provide unique educational experience and financial support through scholarships
- Improving quality of MS & PhD students
Recruiting Top Students

- CEAS 2019 goal is average ACT score of 30
- We must continue to provide opportunity to students for a world class education while ensuring that they have access regardless of their financial considerations.
Scholarships Required to Achieve Average ACT of 30

- Existing CEAS scholarship endowments total ~$20M
- To meet ACT 30 an additional $50M by 2019
- CEAS Scholarship dollars raised from July 1, 2006 to January 31, 2011: $6,436,576
Engineering Honors Plus Program

- Attract, stimulate and engage the best students in the country
  - Students will be able to graduate in 4 years while doing 3 semesters of engineering practice
  - Will attract approximately 50 additional students each year who otherwise would not come to UC CEAS
  - Will provide full scholarships to qualified students and increase the number of CEAS National Merit Scholars
- ACT minimum for freshmen to participate in Engineering Honors Plus Program will be 33 (average for 10A incoming freshmen was 27.7)
How does CEAS Manage Resources to Achieve our Vision

- Program realignments
- Integrated Engineering
- Improve quality of freshmen and provide unique educational experience and financial support through scholarships
- Improving quality of MS & PhD students
  - Align MS and PhD enrollments consistent with research funding
- Initiate MEng Distance Learning (DL) programs
Issues with Graduate Program

• CEAS has too many graduate students unsupported on research grants and contracts

• Our students’ GRE and other standardized scores are lower than those of students from our peer institutions
Addressing Graduate Program Issues

• Have faculty advisors fund each incoming graduate student

• Develop admission criteria consistent with the standards of our peer institutions and adhere to them
Expanding Graduate Programs

• MEng programs will be expanded by offering courses during evening and early morning hours that are more convenient for professionals.

• A new DL track will be introduced in Fall 2012 in Mechanical Engineering and Electrical Engineering (based on demand indicated by Embanet-Compass Knowledge for DL MEng degrees).
Budget Reality

- CEAS does not have enough non-general funds to sustain a $1.6M general funds deficit without change
- Integrated Engineering
- Program realignments
Suspension of Admissions

• Some program realignments will result in suspension of admissions. Students will no longer be able to enroll in those programs. Students already in the programs will be able to pursue their degree and graduate on schedule with no impact.
CEAS Implementation Plan

School of Advanced Structures

Three program areas:

• BS in Construction Management joint program in collaboration with CoB
• BS in Architectural Engineering with DAAP
• BS, MS & Ph.D. in Civil Engineering
CEAS Implementation Plan (cont.)
School of Computing Sciences and Informatics

- The location of the BSIT program is being evaluated in consultation with the faculty.
- Admissions to the BSCS program will be suspended beginning Fall Semester 2012.
- A small number of courses formerly associated with the BS CS program will be permanently maintained within and/or added to the BS CompE program in the School of Electronic and Computing Systems (SECS).
- The PhD CSE will be housed in the SECS. Existing partnerships will be maintained through selected components of the CS graduate program and the transfer of some CS faculty to SECS. We believe the opportunity exists for these programs to be enhanced through augmentation with CompE components.
CEAS Implementation Plan (cont.)
School of Computing Sciences and Informatics

• A committee composed of 2 CS faculty, 2 SECS faculty, 1 CS UG student, 1 CS graduate student, 1 SECS UG student, and a chair will be charged with the following tasks:
  ➢ Identify an initial list of computing courses at both the undergraduate and graduate levels that will be maintained by SECS as well as an initial recommendation as to how these courses should be staffed.
  ➢ Develop a plan for how best to manage CEAS graduate degrees in the computing area.
• The target date for committee formation is February 15, 2011 with the committee completing its findings and submitting their recommendations to Dean Carlo Montemagno by April 30, 2011.
School of Dynamic Systems and School of Electronics and Computing Systems

BS programs in Mechanical Engineering Technology, Electrical Engineering Technology and Computer Engineering Technology will migrate into a single BS program in Engineering Technology in a School to be determined by the Engineering Technology Committee.
Engineering Technology Committee

• Determine which tracks are in demand by industry
• Determine an appropriate administrative structure
• Determine a curriculum
• Committee will consist of one faculty member from EET/CET and one from MET, one student from EET/CET and one from MET, a faculty and/or school director from both SDS and SECS.
• Dean to form committee by February 7, 2011. They are to provide recommendations by March 10, 2011.
School of Energy, Environmental, Biological and Medical Engineering

Committee formed to maximize synergies and accomplish 3 goals:

1) Reduce undergraduate programs in SEEBME to three, consistent with College resources.

2) Numerous faculty state that SEEBME is too large. We will examine the possibility of relocating some faculty to other schools.

3) Improve the synergy of their programs with all degrees they will develop college-wide tracks for select majors
Educational Synergy Based on Justified Grand Challenges in 2021

- Environmental and/or Energy and Materials
- Biological & Biomedical
- Chemical

Grand Challenges

Intersection: Environmental and/or Energy and Materials

Intersections of Grand Challenges
Identifying Grand Challenges

• Require timely but strategic discussions
  – Among faculty with interest in discipline
  – About challenges/opportunities
  – Over next 10-15 years

• Justification of these challenges
  – To other programs in SEEBME and to CEAS
  – Including how dedication of resources
    • Enhance educational and research missions
    • Improve the recruitment and retention of high quality students from Ohio and the region

• Established a proposed suite of undergraduate educational programs that specifically address the skill requirements that our students need to meet 21st century challenges
CEAS Implementation Plan (cont.)

School of Energy, Environmental, Biological and Medical Engineering

Committee composition: 1 BME, 1 Environmental, 1 Chemical, 1 Energy & Materials, External Chair

Dean to form the committee by February 7, 2011
They are to provide recommendations by March 10, 2011
School of Engineering Education

- Develop and implement Integrated Engineering Program in which first and second year students take engineering module courses taught by multidisciplinary team of professors (Autumn 2011).

- Professor educators will teach elements of the Integrated Engineering curricula under the supervision of tenured faculty members.

- Implement Engineering Honors Plus Program—graduation in four years and three semesters of engineering practice for qualified (ACT min 33) students (Fall 2012)
Graduate Programs

• MEng and MEng Distance Learning programs will reside at the college level with a launch of Mechanical Engineering and Electrical Engineering scheduled for Fall 2012.

• Each program will develop approximately six DL courses.
CEAS Implementation Plan (cont.)

College-wide Issues

- Faculty lines will be replaced on a strategic basis only.
- Currently, there are no plans for reduction of staff. However, there will be staff replacements only for absolutely essential job functions.
- 20% of faculty’s salary and benefits budgeted to a grant must be charged during the 9 month academic year (implemented 1/1/11).
- Index the CEAS Special Fee to 10% of undergraduate tuition for all students (Autumn 2011).
- Involve Professional Practice faculty with planning of Engineering Honors Plus.
Re-branding CEAS

- It is time to re-brand CEAS focusing on:
  - Recognizing the shifting demographics in our undergraduates e.g. better prepared academically, higher career expectations
  - Integrated Engineering Program that helps students apply knowledge and theory to practice
  - Communication of Engineering Honors Plus Program featuring a BS degree in 4 years with 3 co-op sections to attract top students (ACT 30 and above)