

Engineering College Council Meeting Notes

April 2004

The Engineering College Council (ECC) met in Ithaca on April 14 and 15, 2004. The following ECC members were present:

Thomas Armstrong
Richard Aubrecht
Joseph Bonventre
Charles Brown
Kenneth Brown
Jay Carter
Tim Costello
Scott Donnelly
Samuel Fleming
W. Kent Fuchs

James Hauslein
William Hudson Jr
Gretchen Knoell
James McCormick
Venkatesh Narayanamurti
John Neafsey
Jan Suwinski
William Shreve
Sherri Stuewer
Evelyn Taylor

A Non-ECC member, Deborah Cox, Assistant Dean for Strategic Planning, and New Initiatives, also attended the meeting.

Summary of the Executive Session and comments from Council members:

General Comments

- Dean Fuchs has done good work stimulating a hard look at key issues within the College. We are very encouraged with his ability to fund new initiatives and to provide strong leadership. We particularly appreciate his ability to identify and build on centers of excellence and energy within the faculty.
- The Council is very pleased to see that Dean Fuchs is personally working across the Colleges within the University on a variety of initiatives. His actions have contributed to improved relationships with Day Hall and other Colleges. We want to compliment and encourage this kind of interaction outside the College.
- The Council is impressed with the good relationship between Dean Fuchs and the faculty, and we believe this is an important enabler to the necessary change in the College.
- On the topic of ethics, there was a suggestion to consider using already developed case studies to imbed ethics discussions in many different courses. It may be possible to use alumni in seminars to discuss real life issues (only after the litigation is settled!).
- The Council was interested in having the College clarify the grading system used within the College and for required courses outside the College. Grade inflation has become an issue in some of our competitor schools, and it may be a factor in enrollment decisions. As a result, the Council thinks a clear position could defuse rumors, fairly communicate with prospective employers, and perhaps standardize practices among faculty.
- There was interest among the Council members to make a conscious effort to improve teaching, perhaps through the gathering and sharing of teaching best practices.

Undergraduate Curriculum Study

- Council strongly supports the assessment of undergraduate curriculum. Is there a role for the Council in helping the departments within the College reexamine curriculum?
- To begin the curriculum study, look outside at new practices and best practices at other engineering schools. The Council would be very interested in side-by-side comparisons from this analysis.
- Also at the outset of the curriculum study, consider what the curriculum needs are for the major paths our students take after graduation (e.g. theoretical/scientific, business/financial, traditional pragmatic engineering, etc.). Test the flexibility of the curriculum alternatives against these major paths.
- Some of the Council suggested that what is needed is not a new curriculum, but instead new tracks or paths through existing courses corresponding to the careers most students choose after graduation.
- Be sure there is a reward structure or recognition for faculty who assist in the design of new curriculum, particularly young faculty who are not yet tenured.
- There was interest within the Council to understand what process will be used to examine the curriculum. What principles must be maintained? What boundary conditions or limits there are on changes in the curriculum?

International Studies Options

- The Council had a lively discussion on making international study a more feasible part of the engineering curriculum. In general, the group was concerned that the current proposals seemed fragmented and random. There was a concern that a fragmented program would consume faculty and staff resources and benefit only a few students.
- The Council believes that the first step should be to define what the objectives are for international study. Several of the members believed that developing language skills and exposure to a new culture were more important objectives than technical study outside the US.
- Several members of the Council suggested developing summer international programs or international programs that could fit with the existing COOP course schedule would make more sense than expending resources to adjust the curriculum to accommodate the varied needs of a small number of students.

ECC Role, Meeting Format

- The Council appreciates the opportunity to give input on issues in the early, formative stages. For example, the open discussion about curriculum at the April 15 meeting was viewed very positively. Similarly, the Council appreciated the discussion at the prior meeting about the draft strategic plan.
- The Council is interested in understanding what role Dean Fuchs believes the Council should have and whether the Council is meeting his needs. There was a desire to understand clearly what Dean Fuchs was seeking from the Council at each meeting.
- The new meeting format (dinner, one-day meeting, dinner) is the minimum amount of interaction time necessary for a meaningful meeting. The compressed schedule of the April 15 meeting, due to the special functions with the Business School, made it shorter than desirable.

- The Council is willing to provide input between meetings on dynamic topics. Conference calls, web bulletin boards, or successive email postings were considered effective ways to gather input between formal meetings. As an example, early output of the curriculum study could be posted for comments from the Council members.
- A short, closed executive session for discussion is valuable.
- Breakout sessions in recent meetings have not been very productive, but they may be a reasonable lunch format. In general, the Council prefers whole group discussions of proposals and ideas.

Detailed notes from the meeting:

Dinner Presentations – April 14

The evening of April 14th, members of Engineers for a Sustainable World gave presentations on “*Societal Outreach and Impact through the Undergraduate Program*”, describing their experiences with students abroad in locations such as Bosnia-Herzegovina, Honduras, Turkey, Virgin Islands, as well as locally in Tompkins County. The presentations were made by:

Regina Clewlow, Executive Director, Engineers for a Sustainable World
 Douglas Mitarotonda, MEng '03 CS
 Dale Meck, B.S. '04 CEE

State of the College – Kent Fuchs – April 15

Dean Fuchs alerted the Council to topics that will be discussed at future ECC meetings:

1. The Master of Engineering Program – Is it the 5th year of the undergraduate education, a prelude to a PhD, or something entirely different? Departments are currently conducting MEng self studies that will be complete by January 2005. We agreed that the MEng Program would be the primary focus for an ECC meeting after the self-assessments were completed.
2. The research enterprise.
3. A possible joint Arts and Sciences/Engineering Council meeting.

Strategic Planning

The strategic planning process has included the distribution of the plan to faculty, students (both undergraduate and graduate), staff, alumni and friends of the college. Faculty meetings were held in each college department to present and discuss the plan. The plan was also presented and discussed in open forums for undergraduate students and staff. We have received hundreds of constructive comments.

The plan (in the ECC packet) is almost final and we are very proud of the document. It focuses on the six research themes previously discussed with ECC and includes sections on the community, faculty, undergraduate students, graduate students, staff and alumni. We will report our progress towards the Strategic Plan objectives at least once a year with benchmark updates.

Facilities Planning

Three new facilities are part of our goals:

1. The Life Sciences Technology building, which will house the Biomedical Engineering and Biophysics.
2. The Physical Sciences building which will house Physics, Chemistry and Applied and Engineering Physics.
3. A proposed (but not yet approved) Information Sciences and Engineering building that would house Computer Science, Operations Research and Industrial Engineering, and the Theory Center. Located on or near the Engineering Quad, the new facility would free up existing space in Rhodes and Upson Halls that could be renovated to meet the needs of ECE, MAE, MSE and TAM. This building is in the planning stage and has not yet been approved by the Trustees.

Budget Themes

The college has increased the faculty salaries through the salary improvement program. Within the group of our top 15 peers, we now have the #1 median salaries at all professorial levels. To fund the salary improvements the college has cut the funding of two centers costing approximately \$100K each annually and closed the College Machine Shop for an additional savings of \$200K a year. Administrative staffing was also reviewed in the Workforce Planning process and additional savings realized for a combined savings of approximately \$1M. These funds have been reinvested in faculty salaries.

The budget is still a net increase. Our return on investment and the endowment are down but are expected to rebound.

Financial Challenges Over the Next Five Years

The biggest financial challenges the college will face over the next five years are:

1. To grow the faculty by 30 through an increase in the endowment
2. To fund the Department of Biomedical Engineering (\$100M endowment)
3. To renovate existing facilities and build new ones.

College Benchmarking Metrics

Dean Fuchs presented an updated set of college metrics. He showed trend data for total undergraduate applicants, women applicants, underrepresented minority applicants, applicant field interest, ECE and Computer Science applicant interest, post graduate activities, cooperative education program employers and interviews, and USNWR rankings.

The quality of undergraduate applicants has improved slightly and the number of students admitted has remained steady. Fall 2003 applicants had an average combined SAT of 1440 and the average class rank was in the top 2%. Students admitted for fall 2004 show a slight improvement in their combined SAT score (1452). The number of applications as a whole and in each sub-population has fallen but is stabilizing. Applications to Cornell's College of Arts and Sciences increased in 2003 and 2004. The applicant decrease in engineering

appears to be a correction to the temporary dot-com driven applicant increase in the late 1990s. This is substantiated by a significant decrease in applicant interest in Computer Science and Electrical and Computer Engineering in the college and the nation.

We are currently ranked as the #10 graduate engineering program by USNWR with an overall score of 73. Our competitor schools include the Ivy League and institutions with engineering excellence including MIT, Stanford, Illinois, Berkeley, and Texas-Austin. We compete on an equal footing with schools such as Penn State, Columbia and Michigan. While we are at the bottom of the top decile, we are very close to reaching the number 5 school (Georgia Tech – overall score of 77).

Department of Biomedical Engineering

We are moving forward to create a Department of Biomedical Engineering that will have 12-15 faculty. A proposal has been submitted to the Provost and will be reviewed and voted on at the May 2004 Board of Trustee's Meeting.

The Biomedical Engineering Program already exists, but is embedded in other departments. The creation of a department will:

1. Make the program sustainable and externally visible.
2. Set the investment threshold – there is a minimum level of resources necessary for department success.

The Department of BME will lead research in new areas and will collaborate with other departments on research in classical existing areas. Faculty currently affiliated with BME, but appointed in other departments, will remain in their home department but may have a joint appointment with BME.

Call to Engagement and Provosts Priorities and Goals – Provost Martin

New Dean of Architecture, Art, and Planning

Provost Martin announced that Moshen Mostafavi has been named the Dean of Architecture, Art, and Planning. Dr. Mostafavi is a graduate of London's Architectural Association School of Architecture (AA) and Cambridge University, and has been the Chairman of AA since 1995. He is an exceptional architect and person.

Call to Engagement

The President's Call to Engagement went out to 35,000 faculty, staff and students and to 93,000 alumni and parents. Twenty discussion forums were held and 570 responses to the President's questions were received. Most of those respondents commented on two or more of the questions. Nineteen percent offered comments that went beyond the questions.

The common themes that emerged about teaching were:

1. Prepare students with life skills including character development.
2. Increase student interaction with faculty and faculty mentorship of students to help students set their life direction.
3. Educate students about society, culture, and world events to develop engaged citizens.

Provost Martin commented that the engineering faculty are currently expending the maximum effort feasible and that to ask them to do more would require support to offset current responsibilities. She believes that engineering faculty are ahead of the curve in the provision of project and problem based teaching.

Priorities

1. The New Life Sciences Initiative
 - a. Life Sciences Technology Building (\$140M) – This facility, to be built on Alumni Field, will house the Institute for Cellular and Molecular Biology, Biomedical Engineering, and a business incubator.
 - b. Physical Sciences Building (\$100M) – This building will include approximately 100,000 NSF and will be attached to Clark, Baker and Rockefeller Halls. The physical sciences faculty will not grow very much.
 - c. Animal Facilities (\$82M) – A facility at the Vet School to house transgenic mice.
2. Information Sciences – Kent Fuchs and Bob Constable are leading the exploration of capital opportunities. This new facility would co-locate faculty in Information Sciences and Computer Science and free up space for other departments in the College of Engineering.

The intersection of chemistry, physics, computation, and the life sciences is shifting. There are a new set of relationships among the deans and the faculty resulting in more permeable boundaries. This shift will be a force for change in the university as a whole and will support flexible boundaries and interdisciplinary work. Kent Fuchs, Peter Lepage, and Susan Henry have had an important leadership role in creating these intersections.

We are in an arms race in the Life Sciences. Cornell has the advantage that the initiative is faculty led. We are also blessed with special strengths. The combined thrust in the new biology is wonderful for engineering and Cornell. The physical sciences and engineering community has a history of interdisciplinary work and now biology is catching up.

Comments:

- ∴ Cornell has the opportunity to highlight other competitive advantages not mentioned. Integrative biological systems in biology should be featured, as should the relationship with the Vet School. Think about moving beyond transgenic mice to other kinds of model systems.
- ∴ Organismal biology and the ecological sciences are also advantages.
3. Diversity - One of the university's priorities is to increase the diversity of faculty, staff, and students. Dean Fuchs has made requests for funding to recruit underrepresented faculty and I am delighted to be asked for resources for that purpose.

NEW ECC Chair and Vice Chair

Provost Martin and Dean Fuchs announced that due to her appointment to the Cornell Board of Trustees Sherri Stuewer would be stepping down as Chair of ECC. They both thanked Sherri for her exemplary service as Chair of the Engineering College Council and presented her with a gift. Kent announced that Bill Shreve has accepted the Chair position and Jim McCormick has accepted the Vice Chair position.

Undergraduate Curriculum – David Gries, Associate Dean

David Gries, Associate Dean for Undergraduate Programs, presented an overview of the changes in the curriculum since 1948. As in 1948, today's curriculum does not provide much flexibility. Students find it difficult to pursue interdisciplinary majors, study abroad, complete minors, and participate on project teams. Should we revise the curriculum to make it more general but provide additional flexibility? How do we teach students to develop problem-solving skills without having them study an area in depth?

The Strategic Plan has undergraduate objectives in it that include improving teaching. We are considering strategies such as

- Offering a seminar series
- Creating a teaching center

Our ultimate goal is to have an undergraduate program that is rigorous and challenging, yet encouraging and enabling.

Three faculty, Joe Burns, Lance Collins and Charlie VanLoan presented their view of the undergraduate curriculum, its challenges and suggested changes to improve it.

ECC Comments:

- ∴ A summer exchange program where Cornell faculty teach required courses would offer an international experience without requiring revision of the curriculum.
- ∴ If the objective is cultural emersion, don't revamp the curriculum. Use a co-op work experience or other short-term experience to fulfill the goal.
- ∴ If the objective is to expose our students to international faculty whom we believe are better teachers, then revamp the curriculum.
- ∴ Why do we want to offer an international experience? Industry doesn't view this as a positive experience and international faculty are not better teachers. If student enrichment is the goal, don't change the curriculum.
- ∴ Industry does value international experience because it enriches the student's understanding of global business and relationships.
- ∴ Cornell engineering is the best. Recruit talented international graduate students to Cornell.
- ∴ Focus on best practices to improve teaching excellence.
- ∴ To elevate teaching, change the reward system and tenure decision criteria.
- ∴ Employ and embed leading teaching trainers in the college.

- ∴ As changes to the curriculum are considered, poll recruiters and industry to determine what they want.
- ∴ Be careful to subcategorize employers who hire engineering graduates. They have very different perspectives that could be useful in synthesizing different paths for students.
- ∴ Review our grading practices with the goal of eliminating grading on a curve.
- ∴ If our grading policy is harsher than our competitors, inform recruiters of that so they don't directly compare grades from one institution to another. An institution that has a reputation of awarding all As may have a subtle advantage in the applicant pool.
- ∴ Integrate ethics across the curriculum.
- ∴ Reinforce the role of engineering in the development of public policy – CU in Washington is a great idea.
- ∴ The sensitivity to students as customers is a fresh view in the College of Engineering and commendable.
- ∴ Women and URMs don't see themselves as engineers. Engineering is not cool or fun. Market the passion of engineering.
- ∴ Engage ECC in more regular feedback.

Social Outreach and Impact through the Undergraduate Program – Zellman Warhaft

Zellman Warhaft, Associate Dean for Diversity, introduced the concept that engineering undergraduate education is evolving to provide more opportunities for students to participate on projects of social importance and impact. These projects attract a higher percentage of women and may also be attractive to minority students. Zellman described two projects: The Solar Decathlon and Kyoto Now.

ECC Comments:

- ∴ Projects like these appeal to alumni who may be a potential sources of support.
- ∴ How is the curriculum keeping up with world action (reuse, recycling etc.) to protect the environment and design systems and processes to conserve resources? We should track incremental improvements to the curriculum to address environmental issues.
- ∴ Projects attract an over abundance of women. They are tangible – cool – an emotional hook. How do we market this to kids?
- ∴ What role does marketing have in the Strategic Plan?
- ∴ Most high school teachers and parents don't know what engineering is. Presentations of projects like these would be helpful.
- ∴ Engineering societies, industry, and schools also have a responsibility to market engineering.
- ∴ Another vehicle for marketing is CAN.
- ∴ Engineers for a Sustainable World should engage more professional engineers in their work and develop an expertise database that they could call upon where ever they are in the world.

Engineers for a Sustainable World

Regina Clewlow, Executive Director of the National Engineers for a Sustainable World (ESW) presented an overview of ESW including its mission, members, history, projects, partners, and outreach and educational initiatives.

Rachel Davidson, Assistant Professor in Civil and Environmental Engineering, summarized the activities of the ESW Cornell Chapter. ESW is embedded in the curriculum as a course (CEE 402) where academic reflection, engineering content, and service intersect through group community service projects carried out in cooperation with partner community organizations. To be sustainable the course must be for credit and count towards graduation.

Stephanie Arbelovsky, B.S. '05 CEE and Co-president of the ESW Cornell Chapter described the membership (110 members), awareness events, and public service outreach work being done. The Cornell chapter focuses on thinking globally but acting locally.

The barriers to the success of ESW are:

1. Cornell (The institution): Resources – time and money
2. Nationally – Securing permanent or long term funding. Currently the National ESW is supported on temporary seed funding.
3. Cornell Chapter – Finding project supervisors. Assistant Professors are nervous about being an advisor because it doesn't count towards their tenure.

Engineering College Council members could help by being part of a network of project advisors and by providing funding. Project advisors commit about five hours a week for a minimum duration of one semester.

ECC Comments:

- ∴ Nothing is more powerful than an idea whose time has come.
- ∴ Is there an opportunity to engage alumni (particularly retired alumni) to help ESW and increase their bond with Cornell? Alumni could provide technical support, business expertise, and funding.

The ECC ended the meeting in a closed Executive Session to discuss the role of ECC.