

REPORT OF THE 2002 VISITING COMMITTEE
DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF WISCONSIN

The 2002 Visiting Committee met October 10-11, 2002. All twelve members (see attached list) were present. The meeting started Thursday afternoon with a poster session involving some of the graduate students reviewing the research in their group. We then had a tour of the nearly finished Engineering Centers Building and a number of the Chemical Engineering Department's existing teaching and research laboratories. Following a reception and dinner at the Fluno Center, Jim Rawlings gave an overview of the department and pointed out some of its key challenges, e.g. faculty recruiting, space renovation, and adding bio courses to the curriculum.

On Friday we started with a visiting committee breakfast meeting followed by Paul Nealy's overview of the graduate program. In response to issues raised to the 2001 Visiting Committee, there have been changes to the course requirements, the foreign language requirement has been dropped, and all students must now work 2 semesters as a teaching assistant.

Jim Dumesic described some exciting new research results with potential for generating fuel cell hydrogen from biomass.

Nick Abbott talked about Platypus, a new company founded by Nick and two other UW professors to commercialize chemical sensor technology coming from their research. We learned about the key role played by WARF in facilitating this type of entrepreneurial venture and the \$30,000,000/yr they provide to UW out of licensing royalties. The Committee was very interested in understanding UW policies and practices to prevent conflicts of interest between professors' business and academic pursuits. They appeared to be working well.

Juan de Pablo then helped us understand the importance of Research Centers (e.g. his Materials Research Science and Engineering Center) in obtaining federal funding and UW Interdisciplinary Clusters in securing new faculty positions. There was some sense among the Committee that the College of Engineering needs to be more proactive in pursuing new clusters.

The final topic before lunch was a proposal to change the undergraduate ChE curriculum to require two bio courses (6 credits) –one biochemistry and one cell biology. This is in response to the growing recognition that biological systems can be engineered, biological processes can be understood at the molecular level, and application of chemical engineering core skills are highly valuable toward advancement of bioengineering. The Committee agreed with the faculty proposal to add the 6 credits of bio required courses and reduce the required chemistry courses by 6 credits. There is also interest in changing the Department name (e.g. to Chemical and Biological Engineering) in order to attract students and funding, but this does not need to be done to make the above curriculum change and time did not allow the Committee to engage the issues.

After lunch we broke into 3 subcommittees and met for an hour with representative groups of undergrads, graduate students, and junior faculty. These sessions featured very

open dialog and gave the Committee valuable insight into the Department, both strengths and areas for improvement. Separate reports from these subcommittees are appended.

The Committee reassembled in executive session, heard brief reports from the subcommittees, and developed the attached lists of Department Strengths and Improvement Areas. These were then reviewed with available faculty and finally in a meeting with the Dean of Engineering, Paul Percy.

For the Dean we emphasized the importance of adding new faculty, rapidly renovating existing ChE space, and upgrading computing availability. We sensed that Dean Percy was very supportive of the Chemical Engineering Department, recognizes its importance to UW and the College, and will actively support faculty recruiting. He also is working on the computing issues and shares the Department's frustration with the difficulty and slow pace of space renovation. Renovation is handled by the State of Wisconsin and he can't bring in outside contractors. We also tried to get some space freed up by the move to the Engineering Centers Building assigned to Chemical Engineering. However, the Dean said that it is needed first to facilitate moves in conjunction with the planned revisions to the old Mechanical Engineering Building and noted that Chemical Engineering has "enormous" amounts of space currently used for storage. (He did agree that this space needs renovation.)

During our meeting with the faculty, the Committee emphasized the need to upgrade safety and housekeeping and institute a regular inspection program in order to prevent a future incident. It was clear from our laboratory tour and from discussions with the students that safety awareness is poor and departmental policies are not understood or uniformly followed. Committee members volunteered to assist if outside help is desired.

Overall the Committee was very pleased with the health of the Department and stands ready to assist in addressing some of the improvement areas or other matters which come up. Jim Rawlings and the faculty and staff are to be complemented for a very well planned and executed meeting.

Submitted by:

Roger W. Rolke, 2002 Visiting Committee Chair

2002 UW CHEMICAL ENGINEERING DEPARTMENT VISITING COMMITTEE

Robert Armstrong –MIT Department of Chemical Engineering

Kathleen Barton – Searle/Pharmacia

Gordon Brunner –Retired Procter and Gamble

Jeffrey Curler – Bemis Company

**Babatunde Ogunnaike – U. Delaware Dept. of Chemical Engineering
(ex- Dupont)**

Roger Rolke – Retired Shell (2002 Visiting Committee Chair)

John Schmid – Kimberly Clark

Lanny Schmidt – U. Minnesota Dept of Chemical Engineering

Jeffrey Siirola – Eastman Chemical

Harry Spiegelberg – Retired Kimberly Clark

Arthur Westerberg—Carnegie Mellon Dept of Chemical Engineering

David Yarusso – 3M

UW CHEMICAL ENGINEERING DEPARTMENT – KEY STRENGTHS

- **Outstanding Faculty** (The Committee supports continuing to exercise the highest levels of quality control during the faculty recruiting process.)
- **Demanding Academic Program which yields Outstanding Graduates**
- **Collegial Atmosphere with strong Interdisciplinary Networks** (The Committee wants to be sure that University funds are available for matching to support NSF funded Centers)
- **Faculty Continue to Produce Outstanding Text Books and this enhances the Students Education Experience**
- **Department is on the Forefront of Key Changes in Chemical Engineering** (The Committee complements the faculty for their well developed proposal to add bio required courses to the curriculum)
- **Student Exit Polls Providing Useful Feedback and Show that UW Students are Proud of their Degree and Happy with their Overall Experience**
- **New Faculty Application Rate is very high and Current Junior Faculty are pleased to be at UW**
- **Department is Externally Well Recognized and Ranked Very High—it is a strong asset to UW and the College of Engineering**

UW CHEMICAL ENGINEERING DEPARTMENT--- IMPROVEMENT AREAS

- **Need to Upgrade Safety Awareness and Housekeeping—Institute a Regular Laboratory Inspection Program**
- **Faculty Recruiting Needs Continued Strong Emphasis** (The Committee thinks that the goal of increasing faculty size to 20-22 in the face of future attrition will require adding 1-2 new faculty each year. Also adding a senior bio person would be helpful.)
- **Space Renovation and Planning for Future Laboratory Space needs Improvement and Funding** (Must find ways to initiate renovation projects sooner and/or execute them quicker. Need to have renovation underway *before* new faculty arrives. A fairly detailed 3-5 year renovation plan would help clarify support required from the Dean and allow aggressive pursuit of funding. Current overcrowding is a factor in poor housekeeping noted above. Should get future ChE expansion into COE plans. Also it should be noted that many on the Committee think that the Unit Ops. experiments need to be updated.)
- **Communications Still Need Improvement**
 - **Annual Faculty/Graduate Student Forum**
 - **Improved Undergraduate Faculty Advisor Scheduling**
 - **Increased Opportunities for Faculty to Hear About Each Others Research**
- **Clarify Graduate Preliminary Requirements and Have them Consistently Applied** (The Committee found wide variability in what is required for the preliminary exam and when it is

taken. We recommend that it be taken in the second year and be focused on approval of the selected thesis topic. See the Graduate Subcommittee report for further details.)

- **Find Ways to Increase Interest in Graduate School and Academic Careers among UW ChE Students**
- **Improve Availability of Computers Required to utilize Special Licensed Software for Classroom Projects** (The Committee is concerned that support budgets have been cut to bare bones levels. Adequate laboratory and computer support needs to be maintained.)

2002 Visiting Committee Report
Chemical Engineering Department – University of Wisconsin, Madison
October 11, 2002

Members: Gordon Brunner, chairman; Kathleen Barton; Lanny Schmidt; Harry Spiegelberg.

The committee met with four junior faculty members. Overall their feeling was very positive. There is a very high quality atmosphere in the department, and they greatly appreciated the collegial culture, and high emphasis on excellence in teaching and research. They were proud to be there.

Their biggest individual challenge was getting top graduate students, but overall they felt the process worked very well.

Four years ago, the overall main issue raised by this constituency was an excessive workload. Eighteen months ago this had shifted to the integration issues with biotechnology into the department. These issues had passed, and at this point, the main issue was problems stemming from the expansion of the department. This covered adequate space, renovation work, and support personnel for computers.

Discussion brought out the following points that could improve the overall excellence of the department:

- Space Management – The bio-group could benefit from a single point representative to interface with department leadership on space, renovation, safety, and support services for the group.
- Senior Mentoring – The group felt they could all benefit from more regular interaction and guidance from senior faculty during the year.
- Knowledge Sharing – There was a feeling that all would benefit from an increase in the routes for each to better understand what others in the department were doing. This point was stimulated by the positive feelings generated by listening to the presentations by others during the Visiting Committee General Discussions.

2002 Visiting Committee

Undergraduate Subcommittee Report

October 11, 2002

Members: Jeff Curler, Chair; John Schmid, Jeff Sirola, Art Westerberg

The subcommittee met for one hour with 8 undergraduates from sophomores to seniors. Two of the students had completed summer lab and almost all had co-op or intern experience.

The meeting was informal and I feel we got good honest opinions from this group of students.

Comments from the students:

- Positive about co-op experience. Would like the ability to earn 3 credits to eliminate the need to find a 1-credit course. Currently capped at 2 credits. Brought up that Northwestern does not charge students that are on co-op.
- The 2 students who had completed the summer lab thought the experiments were fine. Especially liked the independent projects. They also were provided with laptop computers that greatly enhanced the ability to plot experimental data as they were doing the experiments and catch errors.
- A couple of the students had completed or were currently taking ChE 450 and were disappointed in the course content. They expected a more complete design opportunity. They also commented on the lack of simulation software.
- Again commented on Computer Science courses. Most common was CS 310. This is an on-line course which was liked for accessibility but there was a disconnect with the lecture material and homework. This caused excess time spent.
- Most of students could only access expensive simulation software on the University owned system. They all thought that access was difficult during the daytime hours. Also commented that there was not enough team space where all could connect to collaborate on work.

- They all thought their presentation skills were weak. Could graduate only needing to do four oral presentations. Thought EPD 275 and EPD 155 were good help in this area.
- Favorite classes were ChE 430 with Professor Hill and ChE 311 With Professor de Pablo.
- They were all proud of their technical skills learned at UW and were well prepared.
- We heard from this group of students that their faculty advisors were not accessible. They looked to Kathy in administration for most of their advisory help. They also commented that any interest in Grad school would likely be discussed with grad students and not Professors.

UW Chemical Engineering Department Visiting Committee 2002 Graduate Student Subcommittee Report

Visiting committee members Robert Armstrong, Babatunde Ogunnaike, Roger Rolke, and David Yarusso met with graduate students Tina Bondy, Mike Svarovsky, Alane Wentz, Pierce Hubbard, and Richard Jendrajack.

These students represented the complete range of tenure in their programs, from just beginning to 5 years. They presented not only their own opinions but they also presented issues brought forward at a recent meeting of the Chemical Engineering Graduate Students association (CHEGS).

Some of the things the students cited as positives:

- They enjoy good interactions with their own advisors.
- The computer support for graduate student work is excellent.
- They enjoy the Madison environment. They work hard but also have the opportunity for social and outdoor activities with others in department. (They mentioned Prof. Bird's hikes!).
- The students chose Wisconsin largely based on being favorably impressed by their discussions with faculty.
- They were generally satisfied with the new TA requirement. They thought it was fair.

The areas of concern include:

- **Preliminary Exams:**

The students are unhappy that there is no uniformity to the content or the timing of the preliminary exams. The written guidelines state that it should be completed by the end of the second year and that it should be a proposal for their thesis research. Some advisors use the prelim this way and their students spend a lot of time and effort in preparation of the prelim. Others see it as a nuisance requirement and wait until the student's fourth or fifth year and simply have them summarize the results of papers they have already published.

There are several concerns here. One is the fact that a delayed prelim effectively eliminates the opportunity for the committee to offer constructive suggestions to the student for his/her research or to effectively evaluate the student's readiness for PhD research. It would be unfair to the student to fail him/her on the preliminary exam after 4 years of invested time. Another is the inequity in the amount of work that various students are being asked to do to meet this requirement for graduation.

- **Length of time to complete PhD:**

This was a concern brought forth from the CHEGS membership but it did not seem to be shared by the students we talked to. (We received data from Jim Rawlings that the median time to graduate is 5.33 years and the national average is 5.25 years.) These students said that those who come in knowing they want to finish in a particular time period are usually able to manage it. Others believe they are choosing to do more things (taking additional courses, attending conferences, etc.) which take time but are worth it.

- **Safety:**

This topic was not brought up by the students but the committee questioned them

about it because of concerns some of us had after our lab tours. We asked about the following items based on industrial standard practices and the students indicated that:

1. There was not mandatory safety training prior to beginning laboratory work.
 2. There are no regular safety inspections of laboratories by a department safety committee.
 3. Material Safety Data Sheets were not readily available for all chemicals used in a laboratory.
 4. No standardized labels are available indicating what information is required in labeling experimental materials (such as author's name, phone number, date, primary hazardous ingredients, major hazard types).
 5. Several students cited examples of lack of labeling in their experience, including one case of an unlabeled bottle of HF!
 6. Exiting students are not required to dispose of or transfer ownership of all of their chemicals before leaving. This has led to the need to dispose of unidentified materials.
 7. The lack of space in many laboratories leads to overcrowding and a messy environment, a contributing factor in safety hazards.
 8. The University Safety Department was viewed favorably. They handle disposal of wastes and monitoring of radioisotopes, for example.
- **Student Morale:**

We asked this question partly because of feedback some of us received from conversations with undergraduates over lunch. They told us that they had chosen not to go to graduate school, at least in part because current graduate students advised them against it. The graduate students we talked to acknowledged that some grad students were unhappy but they didn't believe it was a widespread problem. Some of the sources of that unhappiness included issues having to do with the preliminary exam, but we were unable to identify other specifics.

We also were somewhat disheartened to learn that none of these students was planning on an academic career. Some of them had come intending to follow that path but had decided against it based on what they saw in their professors' lives. They cited the fact that the professors were not involved in hands on research but were primarily managers and the high workload demands they live with.

- **Communications:**

There was some concern that there was insufficient communication between the faculty and the students about what was going on in the department. They mentioned that the attendance of the CHEGS president at the faculty meetings was the primary means they had for knowing about issues affecting the department. (The fact that these meetings are open to the students is to be commended.) They suggested an annual forum between faculty and students to air and discuss issues as an idea for improved communication.

They also raised concerns about lack of uniformity in informing students about certain milestone events such as assignment to advisors and passing of the qualifying exams. Although there is an official notification process, some advisors provided the information early to certain students.

- **Teaching Assistantships:**

The students found the new TA requirement and compensation system fair. There was some difficulty with students who had already completed a substantial portion of their PhD work suddenly having to meet this requirement. They mentioned that often, the TAs do not get a copy of the textbook for the class for which they are serving as a TA.