UC 11140 10F

APPROVED DEC 0 8 2010

* UC 10910 10F
& UC 10911 10F from Degree Programs Committee was returned to the table and approved.

TO: Simon Bott, Chair
Undergraduate Council

FROM: Richard Scamell
Academic Policies and Procedures Committee

SUBJECT: UC 11088 10F: Admissions and Enrollment Issues for Undergraduate Engineering Programs

DATE: December 8, 2010

The Academic Policies and Procedures Committee met on Wednesday, November 10 and Wednesday, December 1 to consider UC 11088 10F intended to address a series of admissions and enrollment issues for Undergraduate Engineering Programs. Participating in one or both of the discussions were committee members Betty Barr, Martha Dunkelberger, Debbie Hermann-Henry, Peter Lam, Christine Leveaux, Willie Munson, Richard Scamell, and Larry Williams. Dave Shattuck, Associate Dean for Undergraduate Programs in the Cullen College of Engineering, attended both meetings as a guest.

The purpose of UC 11088 10F is to address six issues that relate to the undergraduate programs offered in the Cullen College of Engineering (CCOE). A brief summary of each issue follows. A more detailed discussion of each issue can be found on pages 1-2 of the November 10 version of UC 11088 10F.

Issue 1. Consistent Admissions Policies for Undergraduate Programs. At the present time, there are three ways a student can be admitted to a major in the College of Engineering:

- As a First Time In College Freshman (FTIC)
- As a transfer student from outside the University of Houston
- As a current University of Houston student who changes their major to engineering from another major at the University of Houston.

The official standards for each of these modes of admission is the same for each major in the College. The issue here is that some programs want to raise their admission criteria while others feel that the current standards are appropriate. It should also be noted that the admission standards for transfer students and current University of Houston students who want to change their major to engineering are the same.

Issue 2. High Failure Rates For Students in Engineering Undergraduate Programs. Engineering students in their first year must enroll in XXXX 1331 courses[1]. Versions of XXXX 1331 are offered for each of the eight undergraduate engineering programs. An analysis of data gathered over the last several years reveals that approximately one out of every three students who take the XXXX 1331 courses actually earn an undergraduate engineering degree. In addition, on average, the pass rate in all lower-level engineering courses is 50 percent.

Issue 3. High Cost for Some Engineering Prospect Evaluation. For some engineering programs, students who have not yet met the requirements for admission to the CCOE are taking XXXX 1331 courses in an effort to prove they are good candidates for admission to these programs. While these courses serve as good predictors of success in engineering, students not already majoring in engineering are not paying the same fees for these courses as students who are already majoring in engineering[2].

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[1] XXXX 1331 courses are Computing For Engineers courses offered by the Departments of Chemical, Civil, Electrical and Computer, Industrial, and Mechanical Engineering.

[2] Students with a major in engineering pay an estimated $70.00 per semester hour enrolled plus a course fee for certain courses. Students who take engineering courses (such as XXXX 1331) but who are not engineering majors pay only the course fee.

Issue 4. USD is Shifting Their Role. In the past, students who wanted to major in engineering but did not meet the admission requirements of the College were admitted as "USD majors." Recently the role of USD has changed with the "USD major" being confined to students with a limited number of semester hours completed. This means that students can no longer be classified as a "USD major" while taking courses to become eligible for admission to an undergraduate engineering program. Thus there is a need for a major for students who hope to, at some point, be admitted to an engineering program.

Issue 5. Desire for Higher or More Predictive Admissions Standards. Some undergraduate engineering programs have expressed an interest in raising the standards of admission to their programs. Some of this has been caused by the high failure rates mentioned in conjunction with Issue 2 while some of this is caused by the high demand for the major in question and the limited ability of the College to grow the Department to meet this demand. An important point that needs to be emphasized is that the situation is not the same for all undergraduate engineering programs.

There are also concerns about the current standards of admission for both FTIC students coming directly out of high school and transfer students. For FTIC students, only SAT and/or ACT scores and class rank are currently used for admissions purposes. High school grade point average or grades in particular high school courses are not used in any way for admission to engineering programs. For transfer students, a combination of chemistry grades and calculus-based physics grades are currently used for admission purposes. The possibility of emphasizing different grades in different science courses for particular programs as a basis for admission to different programs has been raised by faculty in the College.

Issue 6. Potential Loss of Income From Raising Admissions Standards. In the cases of both increased engineering admissions standards and more predictive admissions standards, it is expected that a significant number of students that are currently being admitted to engineering would not be admitted if the changes mentioned above are made. A number of programs and facilities are maintained and operated using the fees paid by students who are engineering majors. With the current moves to trim budgets and reductions in funding, a significant drop in the number of engineering majors must be avoided.

UC 11088 10F proposes four initiatives to address these issues.

1. Redefine the ENGR major to become a major for students in transition to an engineering degree program. This will require clear messages to the students that such students with an ENGR major cannot earn a degree until they change their major, and that substantial fees[3] will be charged to provide services for such students until they change their major.
2. Significantly raise the admissions standards for FTIC students and for transfer students. These admissions criteria are based on factors that the CCOE feels are better predictors of success in the College's various engineering programs.
3. Add a new category of admission to each of the engineering programs from the redefined ENGR major. The criteria for admission from ENGR would vary as appropriate from one program to another.
4. Specify particular engineering courses that can be taken by ENGR majors to demonstrate that they are good prospects for a specific degree program. These choices would be made by the departments that offer those courses.

Initiative 1: Refine the ENGR Major

Current Situation. The ENGR (Engineering Unspecified) major is for freshmen who know they want to major in engineering but have not yet chosen a specific major[4]. ENGR is restricted to students who have not yet completed an XXXX 1331 course. Students are required to petition to declare a major in a specified discipline in engineering once they have completed an XXXX 1331 course. At the present time, somewhere in the vicinity of forty students are classified as Engineering Unspecified (ENGR).

[3] A discussion of these fees is included in the section: Initiative 1: Refine the ENGR Major.

[4] Students who meet the current admission standards for the Cullen College of Engineering are admitted immediately into the engineering major of their choice, thus bypassing the ENGR classification.

Proposal. The ENGR (Engineering Unspecified) major is meant for students who are planning to change their major to a program leading to an undergraduate engineering degree. In other words, the major is intended to be exclusively for students who are in transition to an engineering major where a degree can be earned. The plan is to charge a fee each semester for students enrolled in the ENGR major. In addition, under this initiative students in this major would be advised by Engineering Undergraduate Program advisors at least once every long semester. **A student would not be able to earn a degree while their major is ENGR**.

Implications. Several possible issues and as of now unanswered questions accompany this proposal

1. Included in this initiative is a significant change in the admission policy for the Cullen College of Engineering. This change requires admitting applicants as ENGR majors who (a) meet the University of Houston admission requirements but (b) do not meet the proposed increased admissions criteria for undergraduate engineering degree programs (see Initiative 2).
2. While the increase in the number of ENGR majors may result in an increase in the number of engineering majors, most of the ENGR majors will be attempting to meet criteria (see Initiative 3) that will allow them to move from ENGR to one of the eight undergraduate programs offered in the CCOE (Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering, and Petroleum Engineering). These criteria include a number of science, calculus-based mathematics, as well as engineering courses.
3. It is expected that there may be as many as 750 majors in ENGR within the next few years as the College moves forward with the increased admission criteria in the degree programs described in Initiative 2. The fee charged to ENGR majors needs to be high enough to cover costs for advising, offering additional courses, and monitoring these students. UC 11088 10F projects these costs to be in the range of $250,000 per year. These costs include approximately $90,000 for an additional advisor and staff support, $30,000 for a half-time data analyst, and an estimated $130,000 to offer additional courses for the anticipated increased number of ENGR majors. Using an initial estimate of 500 ENGR majors, it is projected that these costs could be covered with a fee of $250.00 per student per semester enrolled (or $21.00 per semester hour enrolled).

Initiative 2. Raise Admissions Criteria For Undergraduate Engineering Degree Programs

Current Situation and Proposal (FTIC Students). The current admissions criteria for FTIC students have existed for more than fifteen years. Based on available data,for the 1400 students who have earned BS degrees in engineering since 2003, roughly one out of three students admitted under the current admissions criteria has graduated with an undergraduate engineering degree. Further, it is important to note that the average SAT or its ACT equivalent for these graduates has been 1220. As a result, UC 11088 10F recommends that admissions criteria in terms of SAT test score be raised by an average of close to 20 percent for students ranked in the first three quarters of their high school class.

Rank in class	Current SATT (Math+CR)	Current SAT CR	Current ACT Composite	Current ACT Engl. Usage	**Proposed SATT (Math+CR)**	**Proposed SAT CR**	**Proposed ACT Composite**	**Proposed ACT Engl. Usage**
1st Quarter	970	480	22	19	**1200**	**570**	**26**	**24**
2nd Quarter	1050	480	24	19	**1260**	**570**	**28**	**24**
3rd Quarter	1180	480	26	19	**1340**	**570**	**30**	**24**
4th Quarter	Not admissible	Not admissible	Not admissible	Not admissible	**1370**	**570**	**31**	**24**
Unranked	Not admissible	Not admissible	Not admissible	Not admissible	**1370**	**570**	**31**	**24**

Given the increase in the number of quality high schools who do not report class rank, the proposal makes it possible for students from these schools to be admitted under the same criteria used for students in the fourth quarter of their high school class.

Implications. The increased in standards proposed in UC 11088 10F for FTIC students would result in approximately every other recent graduate not been admitted directly to an undergraduate degree program. Stated another way, given the fact that the average SAT test score for CCOE graduates has been 1220, the committee projects a significant decrease in the number of FTIC students (perhaps a percentage of as many as 50 percent) admitted to the Cullen College of Engineering.

Current Situation and Proposal (Transfer Students*). An analysis of students transferring into the Cullen College of Engineering indicates that roughly one out of three students who was admitted and enrolled as a transfer student earned an engineering undergraduate degree. As was the case with FTIC students, the most successful engineering transfer students were those who meet the **proposed minimum grade point average requirements** given below. These criteria would be for transfer students who have earned more than 15 semester credit hours.

Area	Current Minimum GPA	Proposed Minimum GPA
All college level work attempted	2.5	3.00
All calculus courses and math courses with calculus prerequisites attempted	2.5	3.00
All college level chemistry, biology, geology, and calculus-based physics courses attempted	2.5	3.00
All college level English courses attempted	2.5	2.50
All college level engineering courses attempted	2.5	3.00
To be admitted, students must have attempted at least one college level English course, at least one calculus course, and at least one college level science course in the areas listed. In the calculation of each GPA, all attempts count, even if repeated.		

Implications. Implementing the proposed changes in transfer criteria is estimated to result in approximately one out of every three recent engineering graduates not being admitted directly as a transfer student. As such, transfer students not meeting the proposed transfer criteria for engineering but who meet the transfer admission requirements for the University of Houston would be admitted as an ENGR major and given an opportunity to transfer into one of the eight engineering undergraduate degree programs.

Initiative 3. Additional Admissions Criteria For Students From ENGR

The criteria for moving from ENGR to each of the eight undergraduate degree programs are listed below. Students who take more than three attempts to earn a satisfactory grade in required science or mathematics courses or take more than two attempts to earn a satisfactory grade in a required engineering course, will not be admitted to the degree programs. Students who cannot be admitted to any engineering degree plan will be required to change their major out of ENGR.

* A transfer student is defined as a student who transfers to the CCOE from (a) a two-year or four-year college or (b) another major offered at the University of Houston.

Undergraduate Major	Engineering Requirements	Mathematics/Science Prerequisites to Meet Engineering Requirements
Biomedical Engineering	A minimum 2.5 GPA in all attempts at ECE 1331 and CHEE 2331. Must earn a grade of B or better in ECE 1331 to take CHEE 2331. Must complete ECE 1331 and CHEE 2331 before being admitted.	MATH 1431, MATH 1432, CHEM 1332, PHYS 1321, ECE 1100
Chemical Engineering	A minimum 2.75 GPA in all attempts at CHEE 1331, CHEE 2331, and either CHEE 2332 or CHEE 3321. Must earn a grade of B or better in CHEE 1331 to take CHEE 2331. Must complete CHEE 1331, CHEE 2331 and either CHEE 2332 or CHEE 3321 before being admitted.	MATH 1431, MATH 1432, MATH 2433, CHEM 1332, PHYS 1321
Civil Engineering	A minimum 2.75 GPA in all attempts at CIVE 1331, CIVE 2330, and CIVE 2331. Must earn a grade of B- or better in CIVE 1331 to take CIVE 2330 and CIVE 2331. Must complete CIVE 1331, CIVE 2330 and CIVE 2331 before being admitted.	MATH 1431, MATH 1432, MATH 2433, PHYS 1321
Computer Engineering	A minimum 3.00 GPA in all attempts at University of Houston engineering courses, calculus courses, and calculus-based physics courses, with at least 3 of these courses taken at the University of Houston.	MATH 1431, PHYS 1321
Electrical Engineering	A minimum 3.00 GPA in all attempts at University of Houston engineering courses, calculus courses, and calculus-based physics courses, with at least 3 of these courses taken at the University of Houston.	MATH 1431, PHYS 1321
Industrial Engineering	A minimum 2.50 GPA in all attempts at INDE 1331, INDE 2331, and INDE 2333. Must earn a grade of B- or better in INDE 1331 to take INDE 2331 and INDE 2333. Must complete INDE 1331, INDE 2331 and INDE 2333 before being admitted.	MATH 1431, MATH 1432
Mechanical Engineering	A minimum 2.75 GPA in the first two attempts at MECE 1331 and MECE 2336. A minimum GPA of 2.75 in MECE 2334 and MECE 3336, in the first two attempts taken at the University of Houston. Must obtain a B- or better in latest attempt at MECE 1331, MATH 1432, and PHYS 1321 to be able to take MECE 2334, MECE 2336, and MECE 3336.	MATH 1431, MATH 1432, MATH 2433, CHEM 1372, CHEM 1117, PHYS 1321, PHYS 1322
Petroleum Engineering	A minimum 2.75 GPA in all attempts at CHEE 1331, INDE 2333, and CHEE 2332. Must earn a grade of B or better in CHEE 1331 to take CHEE 2332. Must complete CHEE 1331, INDE 2333, and CHEE 2332 before being admitted.	MATH 1431, MATH 1432, MATH 2433, CHEE 2331

Initiative 4. Specify Courses To Be Available to ENGR Majors
UC 11088 10F includes the following courses for ENGR majors who have met the prerequisites for the course and other requirements as set by the departments.

Undergraduate Program	Courses Offered
Biomedical Engineering	BIOE 1100: Introduction to Biomedical Engineering
Chemical Engineering	CHEE 1131: The Challenge of Chemical Engineering CHEE 1331: Computing For Engineers CHEE 2331: Chemical Processes CHEE 2332: Chemical Engineering, Thermodynamics I CHEE 3321: Not Listed
Civil Engineering	CIVE 1188: The Challenge of Civil Engineering CIVE 1331: Computing For Engineers CIVE 2330: Mechanics I (Statics) CIVE 2331: Mechanics II (Dynamics)
Computer Engineering	
Electrical Engineering	ECE 1100: Introduction to Electrical and Computer Engineering ECE 1331: Computers and Problem Solving
Industrial Engineering	INDE 1331: Computing For Engineers INDE 2331: Computing Applications For Industrial Engineers INDE 2333: Engineering Statistics I
Mechanical Engineering	MECE 1100: Introduction to Mechanical Engineering MECE 1331: Computing For Engineers MECE 2334: Thermodynamics I MECE 2336: Mechanics I (Statics) MECE 3336: Mechanics II (Dynamics)
Petroleum Engineering	
Other Courses	ENGI 1100: Introduction to Engineering ENGI 2304: Technical Communications ENGI 2334: Introduction to Thermodynamics

Concerns and Unanswered Questions
During its discussions of UC 11088 10F, the Committee, along with Dave Shattuck, addressed a variety of concerns and unanswered questions.

1. It is clear to everyone that the proposed increased admissions criteria for both FTIC and transfer students will lead to a significant decrease in the number of undergraduate students enrolled in the eight undergraduate degree programs. What is unclear is whether this decrease will be offset by a significant increase in the number of students entering the Cullen College of Engineering as ENGR majors, many of whom would not have been admissible under the current admissions criteria.
2. Under the current admissions criteria, the success rate of engineering students is approximately 50 percent in lower-level engineering courses. Given that the new ENGR major will make it possible for students not admissible under the current admissions criteria to become Cullen College of Engineering students, an increase in the number and perhaps the percentage of engineering students performing poorly in lower-level engineering courses is a distinct possibility.
3. Given the proposed math, science and engineering requirements, it may be necessary for students hoping to earn a degree in fields such as Chemical Engineering, Civil Engineering, and Mechanical Engineering to continue to be classified as an ENGR major for as many as six long semesters. The positive side of this is that each math, science and engineering course taken as an ENGR is included in the student's specific degree program given that the student meets the admission requirements for the engineering major of his or her desire.
4. There is a concern that subjecting applicants from high schools that do not rank to the same admission requirements for students ranked in the fourth quarter of their high school class would

cause the College of Engineering and the University of Houston to miss out on some good students from prestigious local private schools such as St. John's, Kinkaid, Episcopal, St. Thomas, etc. While it is possible that this might occur, the Committee hopes that the Office of Admissions might be able to "flag" such students so that their SAT/ACT test score and grades in high school math and science courses can be reviewed by the Office of Undergraduate Affairs in the Cullen College of Engineering.

5. It is expected that many ENGR students not making it into a degree program will change their major to the Colleges of Technology, Business or Liberal Arts and Social Sciences. It is also a distinct possibility that a number of the courses students take as an ENGR major will not count as part of the degree plan of some other major field of study at the University of Houston. This will be especially true for students who remain an ENGR major for four or more semesters before it is determined that they can not be admitted to one of the eight undergraduate engineering degree programs. As a result many of these students will exceed the 150 semester hours attempted cap before receiving an undergraduate degree at either the University of Houston or from some other state-assisted institution.
6. An unanswered question concerns whether or not the $21.00 per semester hour enrolled fee for students in the ENGR major will be approved by the Office of the Provost and Board of Regents. Should it be approved, students in the ENGR major will pay an approximately $70.00 per semester hour college fee, the $21.00 semester hour ENGR fee, and whatever fees are required for the courses in which they are enrolled. Once accepted in one of the eight undergraduate degree programs, the $21.00 per semester hour fee will be removed. In some cases, this fee will be replaced by a lesser departmental fee.
7. Under the current admissions policy for FTIC students and transfer students, approximately one out of every three engineering students receives an undergraduate engineering degree. While the proposed admissions criteria are expected to increase this percentage for students admitted to one of the eight undergraduate majors, it is not known whether this increase will translate into an increase in the University of Houston graduation rate.
8. The Cullen College of Engineering cannot afford to have fewer students. Thus it is possible that the proposed admission criteria will need to be revised should the proposed increased admissions criteria for being admitted to one of the eight undergraduate degree programs coupled with the expected significant increase in the number of ENGR majors lead to an overall decrease in the number of undergraduate engineering students.
9. College of Engineering faculty members teaching lower-level engineering courses to ENGR students will be asked to teach more and most likely less academically qualified students. On the other hand, faculty members teaching the upper-division engineering courses to engineering students who have met the proposed admissions criteria will possibly be teaching fewer but more academically qualified students.

Recommendation

While recommending that the Undergraduate Council support UC 11088 10F, the Committee recognizes that what is proposed may need to be revised should (a) some of the College of Engineering's and Committee's concerns materialize and (b) some of the unanswered questions have undesirable answers. Nonetheless, the four initiatives have been endorsed by each department in the college as well as by the faculty of the college as a whole. Further what is proposed opens the door for an increased number of students judged not admissible in the past because of a poor SAT/ACT test score to have a chance to succeed in the field of engineering[5]. Ultimately it is the hope of the Committee that the Office of Admissions will have in the future the resources required to provide the College of Engineering along with perhaps other colleges with a way to include in their admissions criteria factors such as each applicant's grades in high school math and science courses plus some sort of normalized high school grade point average.

[5] SAT/ACT scores have historically not been terribly predictive of success in engineering for undergraduate engineering students.