Report From HSSOE Undergraduate Honors Committee
April 24, 2003
SUGGESTED ENGINEERING HONORS PROGRAM

Dean Alexopoulos created the Engineering Undergraduate Honors Committee early in the Winter Quarter of 2003. The HSSOE Rankings Committee had recommended the formation of such a committee during the Fall of 2002. The HSSOE Undergraduate Studies reviewed the recommendation and made supporting comments. The charge to the Committee from Dean Alexopoulos was to present a specific plan for an Engineering Undergraduate Honors Program. The Committee members are S.N. Atluri (Committee Chair; MAE), J.P. Brody (School Representative to Campuswide Honors Committee; BME), G. Kassab (Chair, School Undergraduate Studies Committee; BME), F.A. Mohamed (School Faculty Chair; CBEMS), A. Regan (CEE), W. A. Sirignano (MAE), and A.R. Stubberud (EECS). The Committee has been meeting several times per month since February. A set of recommendations has emerged and will be presented herein.

The Engineering Honors Program is designed to achieve goals that are not accomplished with the regular programs:

1) challenge the most talented engineering students at a level closer to their potentials;
2) attract more of the most highly qualified students to our programs;
3) have a program that attracts the enthusiastic participation and support of the most accomplished engineering faculty;
4) create more contact between the lower-division honors students and engineering faculty;
5) integrate better the science material with the engineering applications;
6) have a lower-division program that allows departments to build special advanced courses for the upper-division honors engineering students;
7) introduce the honors students to scientific advances of the Twentieth Century that are missing from the regular program;
8) establish an Honors program that is worthy of national and international distinction; and
9) allow elements of the Honors program to pass eventually into the regular program.

The new engineering courses and the Engineering Honors Program should remain under the authority of an Engineering Schoolwide Faculty Honors Committee. This will ensure that all majors receive a program of comparable and high quality.

A student in the Engineering Honors Program can also meet the requirements of the Campuswide Honors Program. It will, however, be a still more ambitious undertaking.

The recommendations for the lower-division and upper-division Honors program follow.

LOWER-DIVISION PROGRAM

The recommended program is outlined below with new engineering courses identified in italics. These courses are to be offered in Special Honors sections taught by the most accomplished
engineering faculty. The Honors students will take nine more credit hours of courses than regular students over the six quarters. Further below, the courses are discussed, including the differences with the regular program. Finally, some issues concerning matches with existing degree requirements are discussed.

**FRESHMAN YEAR**

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<th>FALL (17 credits)</th>
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<td>Math 2A</td>
<td>Math 2B</td>
<td>Math 2D</td>
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<td>Chem 1A</td>
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**SOPHOMORE YEAR**

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<td>Physics 7E</td>
<td>Physics 51A or Biotechnology H 1</td>
<td>Physics 51B or Biotechnology H 2</td>
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**LOWER-DIVISION COURSES**

An overview of the courses is given in this section. More detailed new-course descriptions are presented in a later section. The courses are proposed with the firm belief that they will meet ABET basic science requirements and, in a few cases, design requirements. A preliminary analysis accounting for the number of Math/Science units, Engineering Science units, and design units indicates no problems for accreditation purposes. Also, they parallel existing courses taught by Physical Sciences. The differences are generally more units (contact hours) with integration of engineering applications and computational methods. So, if a student desires to or is requested to leave the Honors Program, injection into the regular program at any point should not cause delays in graduation.

Math 2A, 2B, and 2D are the current freshman-year math courses covering differential calculus, integral calculus, and multi-variable calculus. We might negotiate with the Math department to create a special section or two for honors students. Each of these courses is 4 credit hours.

*Engineering Analysis Honors 1, 2, and 3* will cover infinite series, introduction to complex variables, vector calculus (in coordination with Electrical Science Honors 1), linear systems, ordinary differential equations, and first-order partial differential equations. These courses will emphasize the relations amongst mathematical methods, Engineering applications, and
computations. Each course will be 5 credit hours; these 15 credits replace 12 units of Math courses.

The three courses Engineering Mechanics Honors 1A, 1B, and 2 are intended to replace four current courses with significant redundancy: Physics 7A and 7B, Statics (E30, CEE 30, or MAE 30) and Dynamics (E80, CEE 80, or MAE 80). The first two courses will cover vectors, forces, and moments; statics; laws of motion, gravity; conservation of mass, momentum, and energy; torque and rotation; heat and work. The third course Engineering Mechanics Honors 2 addresses the dynamics of particles, rigid bodies, and simple oscillatory or vibrating systems. Also, it should include an introduction to simple deformable structures in vibration: e.g., membranes, beams, and torsion rods. Each course will be 5 credit hours including a laboratory with Eng. Mech. H1B; these 15 credits replace 18 credits from the four discarded courses and remove redundancies.

Electrical Science Honors 1 and 2 will replace Physics 7D and ECE 70A. They deviate from past practice in that here networks are presented before electromagnetic field theory; this aligns better with the way the mathematical foundations are introduced in other courses. The two courses will address steady and unsteady electrical and electronic circuits and networks. The second course will also cover electric fields, magnetic fields, some introductory vector calculus, waves, and optics. A laboratory should be included with the second course. The two courses will each be assigned 5 credit hours including the one unit for the laboratory; the ten credits replace 9 credits of the discarded courses.

Chem 1A is currently required by all engineering programs except for Computer Engineering. It has 5 credit hours including the laboratory. There is an Honors section of this course available to Campuswide Honors students.

Physics 7E (4 credit hours) covers fluids, waves, and optics. It is currently required by most engineering programs. An engineering course that replaces this course and ties the material better to the Electrical Science Honors and Engineering Mechanics Honors courses should be considered.

A two-course restricted elective has been added to the sophomore year. The allowable courses are selected based on the philosophy that all educated people should have a serious introduction to the major scientific advances of the Twentieth Century. Not any science course would serve the purpose here. Rather, only courses presenting outstanding fundamental scientific advances of the past century should be considered. Physics 51A (4 credit hours) covers quantum mechanics and special relativity. Physics 51B (4 credit hours) addresses nuclear physics. (It is arguable that a modern cosmology course might be a reasonable alternative to Physics 51B.) Biotechnology Honors 1 and 2 are proposed new courses that would introduce the student to some of the great advances of modern biology. This is a two-course sequence in modern molecular and cellular biology that would give engineering students an overview of the significant findings that developed within the past 50 years in molecular biology. This is important for a broad technical education, since molecular biology forms base upon which all the life sciences and related technologies build, just as mathematics and physical sciences traditionally has formed the base upon which all of engineering builds.
The breadth courses and departmental choices for required courses are assumed to 4 credit hours each. Nine slots (36 credit hours) are left in the lower-division curricula for these purposes.

Four of the majors currently require the materials course E 54: AE, ChE, ME, and MSE. These same four majors require a thermodynamics course. BME also requires a thermodynamics course. Sophomore Honors students in these majors should be enrolled in Honors versions of E 54 and a thermodynamics course. The addition of required courses Materials Science Honors and Thermodynamics Honors should fit easily with the CompE, EE, and EnvE curricula. Problems arise if we attempt to add either course as a requirement to the CE curriculum or the materials course to the BME curriculum; see the accounting of required courses below. So, the recommendation here is that the Materials Science Honors and Thermodynamics Honors courses replace required courses of the same kind for Engineering Honors students in the AE, ChE, ME, and MSE majors. Other Engineering Honors students are encouraged to fit these courses into their curricula. As a critical mass of Honors students develops, the Engineering Honors Program Committee should consider via bifurcation the creation of two lower division materials science courses. One course would emphasize structural materials but consider functional (e.g., electronic, thermal, and optical) materials; the other course would emphasize functional materials but consider structural materials as well.

The Engineering Honors student is strongly encouraged to use his / her breadth requirement slots to enroll in courses that examine the broader societal impacts of engineers and engineering achievements. Examples of subject matter include the following: history of technology; intersections and integration of engineering with the humanities, law, economy, policy, and/or the arts; management of technology; and engineering ethics. Engineering faculty are strongly encouraged to pursue the development and teaching of such courses. In some cases, it might be appropriate to do so in partnership with non-engineering faculty.

It will be necessary to petition that some of the new lower-division courses are acceptable in meeting the three-course UCI Science Breadth Requirement.

THE FIT WITH EXISTING LOWER-DIVISION PROGRAMS

Again, nine slots are left for breadth and departmentally prescribed courses. (This number does not account for Thermodynamics Honors or Materials Science Honors courses, if we decide that they should be required.) In addition to the mechanics, electrical science, physics, chemistry, and math courses identified in the curriculum above, Aerospace Engineering, Electrical Engineering, and Mechanical Engineering assign 8, 7, and 9 of those courses, respectively, so they have no problem in fitting with the above suggested Honors lower-division curriculum.

Biomedical Engineering, Chemical Engineering, Computer Engineering, Environmental Engineering, and Materials Science Engineering require 12, 13, 10, 12, and 10 of those lower-division courses, respectively, so some adjustment is necessary since only nine are available in the proposed curricula. They do have in their upper-division curricula 3, 6, 4, 11, and 4 Science and Engineering Electives, respectively. So, by using those electives and trading some courses between the lower and upper division, we can fit those degree programs to the proposed Honors
lower-division curricula. Note that Biomedical Engineering would consume all of its electives. Substitution of a suitable modern biology course for the nuclear physics course (Physics 51B) as discussed above would help here.

At first sight, Civil Engineering is a challenge to fit. They require 13 breadth courses and departmentally selected courses in the lower division. They give students choices for specialization in the upper division but do not have clearly identified Science and Engineering Electives. So, a deficit of four courses appears without an obvious opportunity for trading between the lower-division courses and upper-division courses. Informal advice from Professor McNally of CEE indicates that a block of 16 upper-division credit-hours might be made available for an Honors Program.

The Pre-Medical Biomed Engineering curriculum does not appear to have any chance of fitting easily. They need to occupy 12 lower-division courses for department selections and breadth courses but have no upper-division Technical Electives. Perhaps, an honors program is not needed there. That program has been very successful in attracting outstanding candidates; it does not appear fruitful to weaken other programs by trying to modify the Honors Curricula to fit this Pre-Med program.

The Committee has not explored the inclusion of the majors of the new Computer Science and Engineering B.S. degree program in this Engineering Honors Program. Once the standing committee responsible for the Honors Program is established, it should explore in cooperation with ICS the relationship with the new major.

These comments and deductions about the fit with the curricula of the various majors does not account for the addition of a Materials Science Honors requirement or a Thermodynamics Honors requirement. As noted above, the addition of required Honors courses Materials Science Honors and Thermodynamics Honors will fit with the AE, ChE, CompE, EE, EnvE, ME, and MSE curricula. Problems will arise if we attempt to add either course as a requirement to the CE curriculum or if we add the materials course to the BME curriculum.

A summary of the existing additional requirements of the nine majors and the fit with the proposed Honors curricula follow.

**OTHER EXISTING LOWER DIVISION REQUIREMENTS**

**AE** (8 courses) -- Chem 1B; 4 Breadths; E 54, MAE 10, 91. These requirements do not conflict with proposed lower-division Honors curricula.

**BME** (12 courses) -- Bio 7; Chem 1B, 1C; 3 Breadths; BME 1, 50A, 50B; CBEMS 40A; and ECE 12, 20. BME has three upper-division science / engineering electives that must be used to fit the proposed Honors curricula.

**ChE** (13 courses) -- Chem. 1B 1C; 51 A, 51B, 51C; 4 Breadths; CBEMS 40A, 40B; E 54; ECE 10. ChE has six upper-division science / engineering electives, four of which must be used to fit the proposed Honors curricula.
CE (13 courses) -- Chem 1B, 1C; 6 Breadths; CEE 10, 11, 81A, 81B; ECE 20. CE has four upper-division science / engineering electives that must be used to fit the proposed Honors curricula.

CompE (10 courses) – Math 6A; 4 Breadths; ECE 12, 20, 31, 40, 70B. CompE has four upper-division science / engineering electives, one of which must be used to fit the proposed Honors curricula.

EE (7 courses) -- 4 Breadths; ECE 10, 31, 70B. These requirements do not conflict with proposed lower-division Honors curricula.

EnvE (13 courses) -- Chem 1B, 1C, 51A; Science Elective; 4 Breadths; CEE 10, 11 81A, 81B; MAE 91. EnvE has eleven upper-division science / engineering electives, four of which must be used to fit the proposed Honors curricula.

ME (9 courses) -- Chem 1B; 4 Breadths; E 54, MAE 10, 52, 91. These requirements do not conflict with proposed lower-division Honors curricula.

MSE (11 courses) – Chem 1B, 1C; 5 Breadths; CBEMS 40A, 40B; CEE 10; E 54. MSE has three upper-division science / engineering electives, two of which must be used to fit the proposed Honors curricula.

UPPER-DIVISION REQUIREMENTS

The upper division program is intended to keep the Honors students engaged in special demanding scholarly activities that provide both the unusual technical breadth and depth expected of an Honors student. They will be able to do creative work and to learn about advanced topics. Specifically, four features of the upper division program are noted.

During the junior year, the faculty from each major should take at least two of its required courses and create special Honors sections. These courses will have expanded content and count five credit hours each. These sections should be totally distinct from the sections associated with regular curricula. Honors students in the major will be required to enroll in both courses.

Honors students will be required to do independent work and to write a thesis during the senior year.

Technical breadth is very important for this group of elite students that we expect to be future leaders. Honors students therefore should be strongly encouraged to enroll in a few Honors courses taught for other majors. This will not be a strict requirement but something that is openly encouraged. The faculty supporting the Honors courses within each major should welcome Honors students from other majors.
Honors students should be encouraged to enroll in a few graduate courses during their senior year. The exposure to graduate education will advance their knowledge and should make them more likely to continue with graduate education. This will not be a strict requirement but something that is openly encouraged. The faculty teaching the grad courses should welcome undergraduate Honors students from any undergraduate major.

The Committee is still exploring novel advancements to Design Education. Consultation with an industrial colleague has occurred on this matter. A report should follow in a few months on this issue.

NEW-COURSE DESCRIPTIONS

**Biotechnology Honors 1- Engineering within the Cell:** This course provides an engineer's view of cellular processes. Introduction to the cell; structure and function of DNA, RNA, and protein; thermodynamics; energy and catalysis, conversion of chemical energy to mechanical motion; feedback and control of gene expression; networks and cell-to-cell signaling.

**Biotechnology Honors 2 - Intro to Molecular and Cellular Engineering:** This course provides an overview of engineered applications for the analysis of cells and the engineering of cells for manufacturing or sensing purposes. Analysis of DNA and protein; DNA sequencing; PCR; cloning; transgenic cells and animals; engineering and production of fusion proteins; DNA hybridization; whole genome assembly.

**Electrical Science Honors 1:** Models of passive and active electric circuit elements; voltage and current laws and circuit equations; steady state and transient responses of electrical circuits; Laplace transforms and the s-plane; complex frequencies and impedance concepts; sinusoidal steady-state and transient responses of general RLC circuits. 5 units including 1 design unit.

**Electrical Science Honors 2:** Network functions, frequency response concepts, and Bode plots; energy and power; two port networks and characterizations; electric charge and electric fields; charge in motion, magnetic fields, magnets, Faraday's law; interactions of electric and magnetic fields, Maxwell's equations; light and optics. **Electrical Science Honors Laboratory II:** Characterization and measurements of active and passive electric elements; characterization and measurements of RC, RL, and RLC circuits, steady state and transient; characterization and measurements of resonant circuits, series and parallel; characterization and measurements of electric and magnetic fields; characterization and measurements of interactions of electric and magnetic fields; characterization and measurements of basic optical devices. 5 units including 1 unit lab.

**Engineering Analysis Honors 1:** Infinite sequences and series, use of approximations, the relationship between computations and exact mathematical representation; introduction to complex variables, transformation of problems; Fourier series, techniques for data analysis. 5 units.
Engineering Analysis Honors 2: Line and surface integrals, vector calculus, introduction to tensor calculus, selected problems in field theory, numerical evaluation; introduction to probability and statistics, techniques for data analysis. 5 units.

Engineering Analysis Honors 3: Linear algebra, matrices, eigenfunctions and eigenvalues, analysis of linear systems; ordinary differential equations, first-order partial differential equations, simple dynamic systems, finite-difference methods. 5 units.

Engineering Mechanics Honors 1A: Scalars, vectors, tensors; mass, force, moment, inertia; statically determinate systems (trusses) in equilibrium. Free-body diagrams; Newton’s Laws of Motion; Galilean reference frames; velocity of light, restricted Theory of Relativity. 5 units.

Engineering Mechanics Honors 1B: Conservation of mass, momentum, and energy; heat, work, entropy, and Gibbs free energy; torque, and rotation; finite rotation vector, and finite rotation tensor; systems with finite degrees of freedom; Lagrange’s & Hamilton’s Principles. 5 units including 1 unit lab.

Engineering Mechanics Honors 2: Dynamics of particles & rigid bodies; large & small rotations; vibrations of single & multi-degrees of freedom systems; statically determinate deformable bodies: simple tension, simple shear, bending of symmetrical-cross-section beams, torsion of circular bars, and thin tubes; statically indeterminate systems; introduction to theory of elasticity. 5 units including 0.5 design unit.

Materials Science Honors: An "Honors" Section for the course, E54, would be created. New topics, which are not at present covered or are not covered in depth in the current E 54, are included: structures, behavior, and applications of electronic materials, optical materials, nanomaterials, composite materials, and biomaterials; diffusion in materials; phase transformations; elasticity and residual stress; imperfections and their property effects; strengthening processes; high temperature properties; and fatigue. An "Honors" section for the lab course CBEMS 50L will include experiments dealing with some of the materials mentioned above. 5 units including 1 unit lab.

Thermodynamics Honors: Thermodynamic properties, including the relevance of quantum mechanics. First and Second Law of Thermodynamics applied to open and closed systems. Applications to machines, chemical systems, and biological systems. 5 units.

RELATIONSHIP TO THE CAMPUSWIDE HONORS PROGRAM

In principle, qualified UCI Engineering students can choose to belong to the Campuswide Honors Program, the Schoolwide Honors Program (described herein), both programs, or neither program. We have consulted with Professor Roger McWilliams, the Director of the Campuswide Honors Program, who has expressed enthusiasm for our proposed program and believes that it can mesh with the Campuswide Honors Program (CHP). The CHP students have some constraints within the Campus breadth requirements; they enroll in honors sections of the three Humanities Core course sequence H1A, B, C. Also, they take the Critical Issues in Social
Sciences course sequence H1 E, F, G. There are special extracurricular activities and on-Campus housing opportunities reserved for CHP students. Some Engineering students currently are enrolled in CHP. Our expectation is a significant fraction of the Engineering Honors students will elect to participate in CHP. At the same time, some qualified students will elect CHP but bypass the Engineering Honors Program. The philosophy is to operate as many as possible of these voluntary opportunities that attract and benefit outstanding students.

SEPTEMBER INDEPENDENT ACTIVITIES PERIOD

We propose a September Independent Activities Period for the Engineering Honors Students. The September Independent Activities period would begin the Tuesday after Labor Day and continue onto the first day of classes. This is typically about three weeks. Honors students would be encouraged to be on campus during the month of September. Incentives may include free parking, housing, and/or stipends. There are several ways to structure such an activity period. For example, these students might participate in a range of independent activities. Activities may include some or all of the following: laboratory research, independent studies, independent projects, not-for-credit courses, and intensive short for-credit courses, examples are listed below:

- Participate in laboratory research, working on their senior thesis, for example.
- Independent studies, this is primarily library-based, for instance:
  - Study of a language (e.g., Japanese)
  - Study of a topic (digital encryption systems)
  - Study of a subject (nuclear reactors)
- Independent projects, this is more hands-on, can be done individually or in teams:
  - Computer graphics simulation of a flock of birds
  - Reverse-engineering Microsoft's Xbox
  - Team programming competition
- Special short courses, not for credit, would be offered during this period. These may be single session one-time lectures or multi-session classes. Proposed classes are:
  - Introduction to intellectual property: The fundamentals of copyright, trademark, and patent law. Writing, filing, and licensing US patents.
  - A few for-credit courses may be offered. This is appropriate for courses that are best taught intensively: laboratory techniques courses, language/computer courses, and field research. A few examples might include:
    - Computational Tools for Engineering (MATLAB, Mathematica, etc.);
    - SQL databases. (Database design and the structured query language);
    - Analog Electronic Circuit Design.

It would be impractical to implement a large number of these examples for the relatively small number of Honors students. It is possible, however, that the program could grow beyond the original numbers and go beyond the Honors Program; so, our initial thinking has not been limited.
Another model, which would be easier to execute in the short run, might limit activities to short courses. These short courses would be for-credit intensive courses that would explore topics at the intersection of engineering and society or engineering and other disciplines. Two of the short courses, to be offered every year, might be on developing a senior thesis (finding a topic, research project design, data analysis) and on writing a senior thesis. Short courses would be taught by engineering faculty or qualified faculty from other disciplines, or they would be co-taught by two faculty members. The suggested restriction on faculty teaching (namely that the instructors be limited to senior faculty) in the honors program would be relaxed for these courses. More junior faculty would be encouraged to develop these less formal courses.

RESOURCES AND MANAGEMENT

There are currently 492 sophomores and 435 juniors enrolled in Engineering programs. (Note that the terms "sophomore" and "junior" refer to the total number of units the students have completed and have little to do with the more traditional reference points towards graduation.) If we take for the moment the requirement of a 3.50 GPA for entry into an Honors program, there are 58 sophomores and 65 juniors at or above that level. So, 123 / 927 students or 13% currently meet the 3.5 GPA threshold. We can expect some qualified students might be motivated in other directions: e.g., some students might prefer to pursue double majors, leaving no flexibility to meet the Honors Program requirements. At the same time, we can expect this program to attract substantially more highly qualified students to UCI who otherwise would not enroll here. So, for the sake of analysis, we shall assume about 70-90 students per year will enroll in this program once steady-state is reached in roughly three years. The first Freshman class would enter in the Fall of 2004.

Minority participation in the Honors Program is important. So, some projection on this issue is valuable. Currently, Engineering has 71 minority sophomores and 50 minority juniors. This amounts to 121/927 or 13% of the student enrollments. Of these students, we have 3 students at each level at or above a 3.50 gpa; so 6 / 121 minority students or 5% meet that threshold compared to 13% of the total student number. It also means that 6 / 123 or 5% of the qualifying students are minorities. So, based on these numbers, the under-representation of the minority students would be greater for the Honors Program than for the regular program but there would be visibility of their representation.

We have under planning here ten-to-twelve new lower-division courses or sections for the Honors Program that must be offered every year. Let us assume that upper-division Honors sections are created in a certain efficient manner by the five departments that manage the nine Engineering majors; a department managing two majors will have students from the two majors required to take the same two upper-division courses. Thereby, the School must create ten upper-division Honors sections each year. Of course, supervisions of the 70-90 senior theses would be an additional workload. Some faculty time would be required to manage this program. It is estimated that seven-to-eight additional regular-ranks faculty are needed in the School to operate this program. These numbers can be built over three-to-four years if we start the program with incoming freshman and extend the coverage upward through the curricula yearly. Most of the
new faculty would not be hired to teach the Honors courses but rather to assume the original workload of those faculty who are re-assigned to teach the Honors courses.

Substantial Resources will be needed to mount the September Independent Activities Program. It is recommended that donors be sought to provide the funding for this special opportunity for talented students.

Chancellor Cicerone has expressed interest in raising special gifts to support this Honors Program. In addition to faculty positions and September Activities Program, scholarships will be vital in attracting more of the very highest quality students here. A first estimate is that an additional 40 to 50 four-year scholarships are required annually. These scholarships are typically valued at $40,000 to $50,000 for four years. So, roughly $2,000,000 annually is required.

If we are serious about the goal to achieve national and international distinction for the Engineering Honors Program, the management scheme is critical. The program should be managed by a committee of faculty selected by the Dean of the School of Engineering. Senior faculty with very high academic standing and commitment to undergraduate education should form the majority of this Engineering Honors Program Committee. The reporting of the Committee directly to the Dean is also critical because the symbolism of the Dean’s direct involvement will raise the stature of the program. The Engineering Honors Program Committee should have approval authority over recommendations from the Chairs concerning the selection of instructors for Honors courses and the selection by the departmental faculties of upper-division courses for Honors status. It is critical to maintain a uniformly high standard across the majors. Also, some chairs, left to operate under their usual real-world pressures might tempt to assign part-time faculty, untested new faculty, or tested-but-controversial faculty to Honors courses or sections.

**SUMMARY OF MAJOR RECOMMENDATIONS**

The following actions for the School and Campus are strongly recommended by the Committee.

1) Create an Engineering Undergraduate Program that will achieve national and international distinction.
2) Create the courses: *Engineering Mechanics Honors 1A, 1B, and 2; Engineering Analysis Honors 1, 2, and 3; Electrical Science Honors 1 and 2; Biotechnology Honors 1 and 2; Materials Science Honors; and Thermodynamics Honors.*
3) Approve the Lower Division Honors Program described above.
4) Approve the Upper Division Honors Requirements described above.
5) Establish the September Independent Activities Program.
6) The Dean should form a standing committee as described above to manage the Engineering Undergraduate Honors Program.
7) The managing committee should maintain a good working relationship between the Engineering Honors Program and the Campuswide Honors Program.

The Engineering Undergraduate Honors Committee endorses this report and its major recommendations unanimously.