

Quick Guide to Interviews

Interviews: One-to-one conversations designed to elicit in-depth information. Interviews can be used to collect indirect or direct evidence.

Interview Strengths and Weaknesses:

| Strengths | Weaknesses |
|---|--|
| <ul style="list-style-type: none"> • Provides rich, in-depth information and allows for follow-up questions. • Can reveal the “why” and “how” behind the “what.” • Flexible in format: may range from highly structured to open-ended and exploratory; may include questions about many issues. • Telephone interviews can be used to reach distant respondents. • “Stories” can be compelling evidence for some stakeholders. | <ul style="list-style-type: none"> • Labor intensive at every stage: planning, coordinating, conducting, transcribing, analyzing, and reporting. • Skilled interviewers needed. • What people say they do or know may be inconsistent with what they actually do or know. • The process can intimidate some participants, especially if asked about sensitive information and their identities are known to the interviewer. |

TIPS:

- Conduct the interview in a quiet environment that allows the interaction to be uninterrupted.
- Put the participant at ease. Do more listening than talking.
- Give the participant time to process the question. S/he may not have thought about the issue before, and may require time to develop a thoughtful response.
- Paraphrase to verify that you have understood the participant’s response. The participant will sometimes realize that what s/he said is not what was meant and will clarify.
- Make sure you know how to record the responses and include a backup system!

NOTES:

Exit Interviews: Student Perception and Achievement, and;

Unsolicited Political Commentary

A UH Assessment Office Presentation by

Daniel M. Jenkins
Associate Professor and “Program Chair”
Biological Engineering

December 15, 2009



Nomenclature:

ABET = *ABET Inc., the accrediting body for all Engineering programs at UH (formerly “Accreditation Board for Engineering and Technology”)*

FE Exam = *Fundamentals of Engineering Exam; first step in the pathway to engineering licensure.*



Outline:

- Background on Biological Engineering (BE)
- Evolution of a (BE) Program Specific Assessment Plan
- Role of Exit Interviews
- Reflection



Outline:

- **Background on Biological Engineering (BE)**
- Evolution of a (BE) Program Specific Assessment Plan
- Role of Exit Interviews
- Reflection



Mission and Objectives of Biological Engineering Program (Slide From CTAHR Dean)

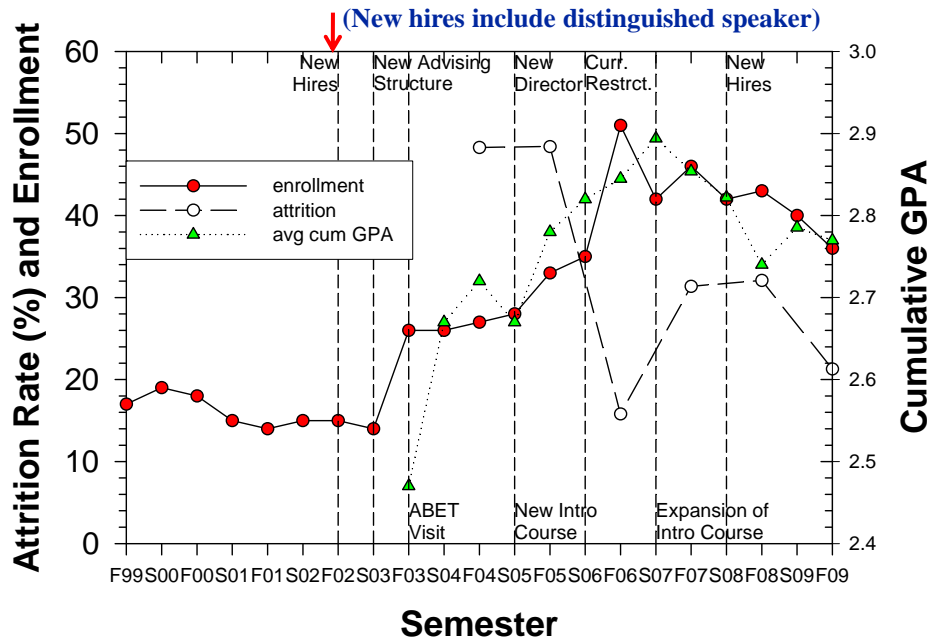
Mission: Provide engineering students a unique opportunity to study biological systems from the engineering perspective !?

Educational Objectives:

- Graduates will be able to apply the fundamentals of engineering.
- Graduates will become engineers with the skills to design, manufacture, test, and/or operate systems in which living organisms or biological products are a significant component.
- Graduates will have the skills to function in modern society as expected of a professional engineer with a baccalaureate degree.

Rejected by ABET, 11/24/2009

History of Biological Engineering at UH



BE Tenured Faculty:

Transgenic Plant and Protein Engineering

Development of Rice Cell Strains for High-Strength Features of Rice Functions

Improving Quality of Plant-based Food Products from 1st-Generation Cereals

Wei-Wen Su

Sensors and Instrumentation

Electrochemical DNA hybridization sensors:

- fast and low-cost
- easy and robust operation
- allow and extend applications
- allow physiological condition support

Daniel Jenkins

EMC Technology for Bioremediation of PCBs

- High density of microbial cells
- Various types of microbial cells
- Portable

Ping Yi Yang

Engineering Economics

- Optimal Harvesting Strategies for Farmed Fish and Shrimp
- Direct Marketing of Freshwater Ornamental Species
- Comparative Advantage of Aquaculture Species
- Modeling Longline Effort Dynamics and Protected Species Interaction
- Disease Risk Mitigation Model for Shrimp Aquaculture

PingSun Leung

Value Added Agriculture/ Product Analysis

Coffee drying

- on farm development of dehumidifier dryer
- farm fabricated PVC drying racks for hushidans

Near Infra Red Spectroscopy (NIRS)

- detect green bean place of cultivation
- detect chemical contamination in green bean
- Kava beverage preparation optimization

Loren Gautz

Retired 10/09

Switched depts., 04/09

BE New (Untenured) Faculty (Hired January 2008):



Samir Khanal
Bioenergy and Biobased Products; Waste-to-Energy



Gönül Schara
Protein/ Enzyme Discovery/ Engineering, Metagenomics

Resigned, 08/09

New Shop Engineer: Ryan Kurasaki (Hired August, 2008)



Graduate of BS and MS programs in Bioengineering (Biological Engineering) at UH; formerly employed at Hawaii Natural Energy Institute

Cooperating Faculty:



Jian Yu

Biopolymers, Biofuels, Enzyme Catalysis, Bioprocessing
(Hawaii Natural Energy Institute)

Engineering Economics

- Optimal Harvesting Strategies for Farmed Fish and Shrimp
- Direct Marketing of Freshwater Ornamental Species
- Comparative Advantage of Aquaculture Species
- Modeling Longline Effort Dynamics and Protected Species Interaction
- Biosecurity Risk Mitigation Model for Shrimp Aquaculture

PingSun Leung



Soojin Jun

Food Engineering; Biosensors
(Dept. of Human Nutrition, Food, and Animal Science)



Scott Turn

Biomass to Bioenergy; Thermochemical Conversion
(Hawaii Natural Energy Institute)



Ali Fares

Watershed Hydrology
(Dept. of Natural Resources and Environmental Management)

Outline:

- Background on Biological Engineering (BE)
- **Evolution of a (BE) Program Specific Assessment Plan**
- Role of Exit Interviews
- Reflection



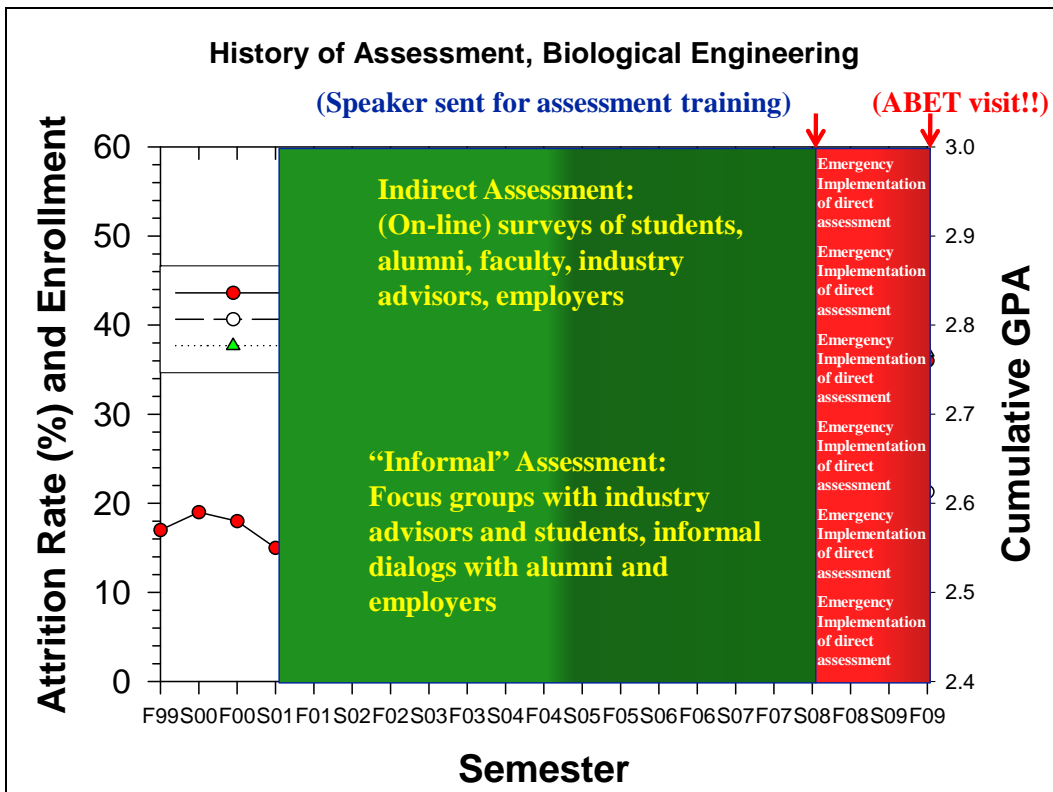
BE Program Student Learning Outcomes

- Solve problems involving differential equations.
- Solve problems involving mechanics, electro-magnetics, optics (physics); inorganic and organic chemistry; general- and micro- biology.
- Solve engineering problems involving statics, dynamics, fluid mechanics, and thermodynamics.
- Design system, component, or process in which biology plays a significant role.
- Design and conduct experiments to support engineering design.
- Use modern engineering techniques, skills, and tools to identify, formulate, and solve engineering problems.
- Function effectively on multi-disciplinary teams.
- Identify professional and ethical responsibilities when practicing engineering.
- Communicate effectively in large and small groups.
- Identify impact of engineering solutions to surrounding context.
- Engage in life-long learning through participation in professional conferences, workshops, and courses, and by reading and writing in relevant literature.
- Intelligently discuss contemporary issues.

(Drafted for initial ABET accreditation, ca 1999)

BE Program Student Learning Outcomes

| BE Program Outcomes | ABET Outcomes |
|---|--|
| The graduate | Students attain |
| a) has the ability to solve problems involving differential equations | a) an ability to apply knowledge of mathematics, science, and engineering |
| b) has the ability to solve physics problems involving mechanics, electromagnetic, and optics; chemistry problems involving inorganic and organic chemistry, and; problems involving general- and micro-biology | a) an ability to apply knowledge of mathematics, science, and engineering |
| c) has the ability to solve engineering problems related to statics, dynamics, fluid mechanics, and thermodynamics | a) an ability to apply knowledge of mathematics, science, and engineering |
| d) has the ability to design a system, component, or process in which biology plays a significant role | c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability |
| e) has the ability to design and conduct experiments to gather information for engineering designs | b) an ability to design and conduct experiments, as well as to analyze and interpret data |
| f) has the ability to use modern engineering techniques, skills, and tools to define, formulate, and solve engineering problems | e) an ability to identify, formulate, and solve engineering problems, and; k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice |
| g) has the ability to function effectively on multi-disciplinary teams | d) an ability to function on multi-disciplinary teams |
| h) has the ability to identify professional and ethical responsibilities when practicing engineering | f) an understanding of professional and ethical responsibility |
| i) has the ability to communicate effectively in large and small groups | g) an ability to communicate effectively |
| j) has the background to understand the impact of engineering solutions on the surrounding context | h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context |
| k) recognizes the need to engage in life-long learning through participation in professional conferences, workshops, and courses, and by reading and writing in the relevant literature | i) a recognition of the need for, and an ability to engage in life-long learning |
| l) has the ability to intelligently discuss contemporary issues | j) a knowledge of contemporary issues |



New Assessment Processes Implemented:

Rubrics-based direct assessment of student work

Students must take (but not necessarily pass) the FE exam to graduate

Focus groups (student and industry) tied to outcomes assessment

Phone interviews with employers of alumni

Course Evaluations standardized, and shared across program

Graduation/ exit interview with program chair



Rubrics-Based Assessment:

Rubric For Outcome e: The graduate has the ability to design and conduct experiments to gather information for engineering designs

| Criteria | Quality | No proficiency (1) | Developing (2) | Proficient (3) | Exemplary (4) |
|---|---------|--|--|---|--|
| i) Can use models of a process to identify the most salient characteristics governing system behavior. | | Fails to understand/ recognize cause and effect in simple engineering models/ equations. | Can understand and apply simple predictive relationships with one independent variable. | Can determine relative effects of all parameters in complex multivariable models. | Understands effects of all variables, and recognizes which can be most easily/ effectively controlled/ modified in a design. |
| ii) Has the ability to design a simple experiment, with effective controls, to quantitatively measure relevant parameters. | | Cannot use simple lab equipment. | Can follow organized lab instructions to complete a simple experiment. | Can independently use lab equipment to measure a system property, with adequate controls. | Can independently develop an effective written experimental plan. |
| iii) Has a fundamental understanding of accuracy and precision of a measurement, and the compounding of errors/ uncertainty in related estimates. | | Does not understand precision or accuracy. | Has a rudimentary understanding of precision and accuracy, and qualitatively how they relate to design performance and/or uncertainty. | Can quantify the accuracy and precision of experimental data through calibration, and relate these to the degree of uncertainty in a measurement. | Can determine the uncertainty of an estimate based on imperfect measurements of multiple related parameters. |
| iv) Can use appropriate statistical tools to determine the power/ reliability of an experiment. | | Does not demonstrate familiarity with rudimentary statistics. | Can determine and use basic statistical descriptors such as mean and standard deviation. | Is capable of using elementary statistical comparisons to classify differences in experimental treatments. | Can compensate for normally distributed errors/uncertainty in design. |
| v) Demonstrates the ability to logically interpret data. | | Cannot communicate the significance or nature of experimental results. | Can use experimental data to communicate simple cause and effect. | Clearly communicates experimental results in the context of a given design. | Communicates a clear understanding of the scientific basis/ significance underlying experimental data. |

Rubrics-Based Assessment:

Assessment Data outcome e: The graduate has the ability to design and conduct experiments to gather information for engineering designs

| Criteria | Class* | No proficiency (1) | Developing (2) | Proficient (3) | Exemplary (4) | Mean score |
|--|----------|--------------------|----------------|----------------|---------------|------------|
| i) Can use models of a process to identify the most salient characteristics governing system behavior. | BE 350L | 11% (1/9) | 44% (4/9) | 0 | 44% (4/9) | 2.78 |
| | BE 420 | 0 | 33% (2/6) | 67% (4/6) | 0 | 2.67 |
| ii) Has the ability to design a simple experiment, with effective controls, to quantitatively measure relevant parameters. | BE 350L | 0 | 44% (4/9) | 56% (5/9) | 0 | 2.56 |
| | BE 420 | 0 | 33% (2/6) | 17% (1/6) | 50% (3/6) | 3.17 |
| | BE 481 | 0 | 70% (7/10) | 30% (3/10) | 0 | 2.30 |
| | BE 482 | 0 | 0 | 80% (8/10) | 20% (2/10) | 3.20 |
| iii) Has a fundamental understanding of accuracy and precision of a measurement, and the compounding of errors/uncertainty in related estimates. | BE 350L | 0 | 22% (2/9) | 44% (4/9) | 33% (3/9) | 3.11 |
| | BE 420 | 0 | 0 | 33% (2/6) | 67% (4/6) | 3.67 |
| iv) Can use appropriate statistical tools to determine the power/reliability of an experiment. | NREM 310 | 0 | 33% (1/3) | 67% (2/3) | 0 | 2.67 |
| v) Demonstrates the ability to logically interpret data. | BE 350L | 11% (1/9) | 44% (4/9) | 0 | 44% (4/9) | 2.78 |
| | BE 420 | 0 | 0 | 50% (3/6) | 50% (3/6) | 3.50 |

* Percentage of passing (D or better) students performing at given proficiency level.

FE Exam Based Assessment (90% pass rate for BE!- ~50% nationally):

Assessment Data For Outcome c, 2009/2010: The graduate has the ability to solve engineering problems related to statics, dynamics, fluid mechanics, and thermodynamics.

| Criteria | Venue | No proficiency (1) | Developing (2) | Proficient (3) | Exemplary (4) | Mean score |
|---|--|--------------------|----------------|----------------|---------------|------------|
| i. Can analyze the stresses in a statically loaded system, and design system to prevent stress related failure. | CE 270 FE Exam ^{†,a} | - | - | - | - | 61 (65) |
| i. Can solve basic problems in kinetics and kinematics. | CE 271 FE Exam ^{†,b} | - | - | - | - | 62 (53) |
| i. Can formulate solutions relating pressure, pump power, flow rate, and conduit characteristics/ dimensions in pipe flow | CE 320 or ME 322 FE Exam ^{†,c} | - | - | - | - | 67 (66) |
| i. Understands the relationship between free energy, entropy, internal energy, and enthalpy. | ME 311 BE 460 BE 482 FE Exam ^{†,d} | - | - | - | - | 60 (56) |
| i. Understands the fundamental principles of thermodynamic machines. | ME 311 BE 482 FE Exam ^{†,d} | - | - | - | - | 60 (56) |
| i. Demonstrates understanding of the thermodynamic constraints for energy conversion. | BE 482 BE 410 FE Exam ^{†,d} | - | - | - | - | 60 (56) |

[†] Assessment of student work from Spring 2009. Mean score for FE Exam is percent of questions answered correctly with national average in parentheses, for sections: ^a "Statics" and "Strength of Materials"; ^b "Dynamics"; ^c "Fluid Mechanics" and "Fluids", and; ^d "Thermodynamics" and "Thermodynamics and Heat Transfer".

New Assessment Processes Implemented:

Rubrics-based direct assessment of student work

Students must take (but not necessarily pass) the FE exam to graduate

Focus groups (student and industry) tied to outcomes assessment

Mostly Focused on reviewing program resources, assessment data, and defining strategies to ensure program relevancy and success

Phone interviews with employers of alumni

Course Evaluations standardized, and shared across program

Graduation/ exit interview with program chair



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Focus groups (student and industry) tied to outcomes assessment

Phone interviews with employers of alumni

Some outcomes-related data, and feedback for improving relevancy/ success of program

Course Evaluations standardized, and shared across program

Graduation/ exit interview with program chair



Assessment Data: Employer Interviews

Most feedback is highly positive, but of 31 graduates of program, only 5 employers were successfully reached and agreed to give feedback.

Of 25 graduates since last ABET visit (including 12 graduating Spring 2009):

- ≥ 6 are Engr. professionals
- ≥ 7 continued Engr. or Med. School
- ≥ 6 are in other professions
- 6 are starting family, unemployed, or have not been successfully tracked



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Rubrics-based direct assessment of student work

Students must take (but not necessarily pass) the FE exam to graduate

Focus groups (student and industry) tied to outcomes assessment

Phone interviews with employers of alumni

Course Evaluations standardized, and shared across program

Little faculty interest/ support, and limited direct relevancy to outcomes; to be discontinued

Graduation/ exit interview with program chair



New Assessment Processes Implemented:

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Phone interviews with employers of alumni

Course Evaluations standardized, and shared across program

Graduation/ exit interview with program chair

Putative topic of today's special seminar!



Outline:

- Get student perspective on program priorities
- Evolution of a (BE) Program Specific Assessment Plan
- **Role of Exit Interviews**
 - Determine students' career plans/ goals
 - Maintain contact/ forwarding information
 - Solicit feedback for program improvement
 - Direct assessment of more nebulous outcomes
- Reflection



Typical Topics of Exit Interview:

- Career goals, future plans
- Student perspective on highlighted program priorities (e.g., for BE, relationship to College of Engineering)
- Feedback on quality of program, degree of career preparedness, and suggestions for improvement
- Questions to elucidate student achievement of outcomes j, k, and l...



Review of BE Student Learning Outcomes

- a) Solve problems involving differential equations.
- b) Solve problems involving mechanics, electro-magnetics, optics (physics); inorganic and organic chemistry; general- and micro- biology.
- c) Solve engineering problems involving statics, dynamics, fluid mechanics, and thermodynamics.
- d) Design system, component, or process in which biology plays a significant role.
- e) Design and conduct experiments to support engineering design.
- f) Use modern engineering techniques, skills, and tools to identify, formulate, and solve engineering problems.
- g) Function effectively on multi-disciplinary teams.
- h) Identify professional and ethical responsibilities when practicing engineering.
- i) Communicate effectively in large and small groups.
- **j) Identify impact of engineering solutions to surrounding context.**
- **k) Engage in life-long learning through participation in professional conferences, workshops, and courses, and by reading and writing in relevant literature.**
- **l) Intelligently discuss contemporary issues.**

Exit Interview: Logistics

- Individual interviews (e.g. BE)

| Advantages | Disadvantages |
|--|---|
| High participation rate (100%) | Potential personality conflicts/ reservations |
| Flexibility/ customization to student concerns/ aptitude | Time consuming |
| Students can't hide in the crowd | Interviewer bias |
| | Challenge to get faculty to care |



- Group interviews (e.g., Civil & Env. Engr.)

| Advantages | Disadvantages |
|--|---|
| Efficient | Low participation rate (~50% or less) |
| Some students may be more open- mutually supportive env. | Some students may get lost in the crowd |
| Faculty participation is balanced | Less conducive for gathering direct assessment data |



Exit Interviews: What do we do with the data?:

- Determine students' career plans/ goals
data on achievement of program objectives
- Maintain contact/ forwarding information
facilitate interviews of alumni and employers/ assessment of achievement of objectives
- Solicit feedback for program improvement
prioritize strategies for program improvement
- Direct assessment of more nebulous outcomes
employ strategies to improve program outcomes (??- if deemed necessary)



Assessment Data: Graduating Student Interviews

Students are very sensitive to perceived lack of respect of major compared to other engineering majors.

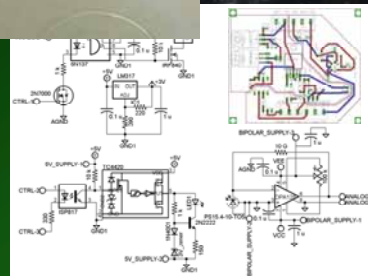
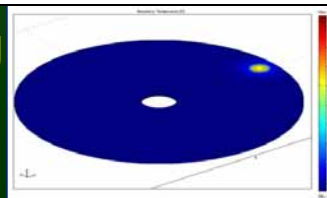
Most graduates strongly urge that BE improve ties/ access and visibility of program within the College of Engineering

This is an extremely urgent priority; discontent from upper division students perceiving poor recognition or disrespect trickles down very efficiently to lower division students- we are facing a major exodus of good students to engineering, and other students just vanishing. Regardless of the reality, student perceptions continue to be a major constraint on program success.



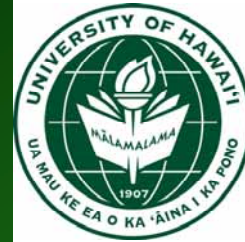
Assessment Data: Graduating Student Interviews

- Create more hands-on open-ended design projects earlier in the curriculum
- Improve training in fabrication/ shop use early on in curriculum
- Include Mechanics/ Strength of Materials in curriculum
- Include/ emphasize deeper coverage of biological topics in BE classes



Assessment Data: Graduating Student Interviews

- Pair up underclassmen with upper division students for mentoring, and also to complete team projects in classes (e.g., BE 191+BE 410?- was tried once with BE 191+BE 420)
- Initiate team extracurricular projects in the discipline
- Continue enhancing the diversity of elective offerings- especially in bioprocessing related areas
- Improve access to supplies and ideas for senior design project



Outcomes j, k, l

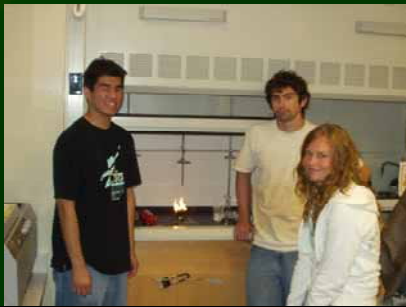
- **j) Identify impact of engineering solutions to surrounding context.**
- **k) Engage in life-long learning through participation in professional conferences, workshops, and courses, and by reading and writing in relevant literature.**
- **l) Intelligently discuss contemporary issues.**



Exit Interview Assessment Data:

Rubrics based direct assessment of exit interview notes indicates that generally students demonstrate proficiency in following outcomes:

- j) Identify the impact of engineering solutions on the surrounding context
- k) Recognize the need to engage in life long learning
- l) Intelligently discuss contemporary issues



Outline:

- Background on Biological Engineering (BE)
- Evolution of a (BE) Program Specific Assessment Plan
- Role of Exit Interviews
- **Reflection**



Reflection/ Summary, Exit Interview:

- Good way of maintaining contact with graduates
- Good mechanism for formally documenting anecdotal feedback and perspectives about program
- Most flawed method for collecting direct assessment data for certain abstract outcomes (except for all the other assessment methods)



Exit Survey, Biological Engineering

Name: [REDACTED]

Permanent/ Forwarding address(es): [REDACTED]

Phone: [REDACTED] (home)

e-mail: [REDACTED]

1. What are your feelings on the Biological Engineering program's relationship with the College of Engineering? How has the relationship impacted the achievement of your academic and career goals (e.g. course registration, access to career and other resources, recognition/ respect of peers and employers, and any other comments)?

Feels strongly that the program needs to partner with the College of Engineering, and was one of the main proponents organizing a student voice to support this change. Partnership is needed to better access support for career placement, to more strongly illustrate the engineering foundation of the major, and to facilitate registration in engineering courses.

2. Do you feel like your preparation in the fundamentals of engineering was sufficient to enable you to complete the senior design, and to enter the workforce as an engineer? If not, what specific areas need to be better or more comprehensively taught (e.g., strength of materials? Fabrication/ shop?) What courses are particularly effective or ineffective? Do you have recommendations for the improvements in the curriculum of the program?

Generally felt that preparation was strong enough to complete engineering design- preparation for industry/ career is more dependent on the field. Specific recommendations/ comments:

- *Require more biology courses and fewer technical electives; not all electives were relevant to goals, but student felt that he did not learn enough biology by completing only through cell biology (BIOL 275/275L).*
- *Supports recent decision to drop Engineering Math Elective- should try to use the credits freed up to support instruction in more important areas.*
- *Felt that standards in many BE courses were low, did not feel challenged enough. Exams were to be very similar to example problems, and were open book in [REDACTED] courses, but indicated that variability also exists in College of Engineering courses- many instructors have low expectations, allow "cheat sheets", etc.*
- *Cited [REDACTED] as a useful course despite low standards for performance.*
- *Learned a lot in [REDACTED], but found [REDACTED] to move too fast/ include too many advanced concepts beyond the pre-requisites- lab component was also too difficult.*
- *[REDACTED] was difficult but at appreciated especially the focus on good technical writing.*
- *Indicated that ME 322: fluid mechanics is more relevant for BE students than CEE 320 fluid mechanics.*

- *Regretted not learning MATLAB sufficiently well in [REDACTED]; instructor only expected students to modify code to achieve an objective, not write their own.*
- *Indicated that [REDACTED] was a waste of time, largely repeating material learned in [REDACTED] and [REDACTED]*
- *Recommended that BE incorporate “tracks” within the major, perhaps by relying more on lower division College of Engineering courses (e.g., more circuits, instrumentation)- this will more effectively allow students to focus and have more coherent themes to the major (currently technical electives seem random and limited in scope).*

3. Did you have adequate opportunity to engage in open-ended design experiences outside of BE 481/482? Which courses were particularly effective/ ineffective?

Cited open ended projects in [REDACTED] and [REDACTED], though the latter was very prescriptive i.e. students were essentially told what to do.

Recommended that more could be done paralleling some of the design courses/experiences in College of Engineering, especially projects and national competitions (e.g., micromouse, Formula SAE/ Baja team, bridge team, concrete canoe, etc...)

4. Do you feel like the senior design course was adequate in scope and format to provide a realistic and comprehensive experience in engineering design? Are there any ways that you feel the experience could be improved or made more effective?

Enjoyed the independence, professional basis of the course, emphasis on initiative and self-reliance. Overall senior design was judged as a good experience, except for the laziness of the instructor [REDACTED].

- a. Is there anything specific way that you could be more adequately be prepared to meet the expectations of the senior design experience?

Require a lower division design course dedicated only to open ended design and tools to facilitate this (e.g., computer aided drawing/ manufacturing), following the model of College of Engineering (see item 3 above; note that it is not clear whether the experiences referred to are formal parts of the curriculum or projects outside of the classroom, but student indicated that Engineering students were required to participate in these experiences).

- b. Were you adequately prepared before the senior design courses to research design standards, literature, and patents? Do you feel capable and confident of doing this after completing the senior design course?

Was not prepared, even in senior design course. Student felt that he is capable of doing a relevant literature search, but still not comfortable/confident about searching patent database. Did not talk about design standards.

5. Is there adequate opportunity in senior design course and/or other parts of the BE curriculum to prepare for the FE exam? Were the FE exam review sessions helpful?

Felt that the FE exam was exceedingly (almost insultingly) simple/ easy. Questioned the relevance of the exam for the major. Did not study for the exam but has high degree of confidence in passing. Does not feel that FE review sessions are necessary. [REDACTED] did tell students they need to download FE handbook for senior design course, but student did not recall much specific material devoted to reviewing the FE exam during senior design (but wasn't paying attention to the exam at the time- note student took exam in October after completing senior design in May).

6. Was it a useful experience to present your senior project (or other research/ design) at the CTAHR symposium? Did you have the opportunity to interact and get/ provide feedback from faculty, peers, and other participants? Were you able to increase your own understanding of your own project and of other design results and needs as a result of your participation? Can you provide specific examples?

Thought participation in symposia (CTAHR and Honors), and especially in national conferences, was extremely useful/ valuable. In CTAHR, most faculty and other participants are not engineers but even so had very helpful comments related to the biology of the problem and different ideas for implementation/ relevance/ applications.

Indicated that he wishes there were a College of Engineering symposium, and also reported on a large degree of college support for students to participate in national competitions and conferences (e.g., item 3 above).

7. What are your plans for after graduation? Do you feel like your degree in BE has helped meet your career goals? Do you feel like there are other majors would have prepared you better? If so, what specifically about other programs would have made it easier to transition into the workforce?

Will spend 3 weeks visiting Japan, then organizing an internship/fellowship through [REDACTED] related to public health in Vietnam. Will then return to graduate school in Biomedical Engineering program on the mainland. Ultimately is interested in pursuing a career in public policy, indicating that it is a shame that more engineers and scientists that understand the fundamental problems of society are not more involved in government/ governance.

8. What do you feel are the most pressing issues facing yourself and society in the short and long term horizons? (ask for specific examples of both)

Economic situation, global warming, unsustainable development (e.g. deforestation and related environmental decline, species decline, and proliferation of disease through degradation in natural ecosystems)..

9. What does Biological Engineering mean to you? What role does Biological Engineering play in society?

The field of Biological Engineering is an interdisciplinary bridge between biology and engineering intended to address fundamental problems in society, including development of alternative energy, development of improved medical/ pharmaceutical technologies, instrumentation, diagnostics, therapeutics, environmental stewardship, food security, etc...

10. In what ways does engineering, especially biological engineering, play a role in helping develop a stable/ diversified economy, address environmental issues, or otherwise address issues facing society (tailor question to specifically refer to issues addressed in item 8)? How would you answer criticisms or the role of biological engineering in society (tailor question specifically to the issues)? To what extent do you feel like these criticisms are valid and need to be addressed by Biological Engineers?

Indicated that examples are too numerous to list, but gave as examples developing alternatives for biology based economy to relieve pressure on deforestation and traditional agricultural practices (e.g. improved efficiency and finding less impactful alternatives for producing biological materials for food, energy, and other needs); the development of sensors and diagnostics to help address emerging medical problems, environmental technologies for waste treatment and biological remediation, diversification of the economy through efficient agricultural production and value-added processing, development of alternative energies e.g. ethanol and oil from algae.

When asked about criticisms of ethanol production, was aware of issues of land use (e.g. deforestation to grow more crops) and competition for food resources, and overall low (and perhaps negative) yield on cultural energy expended. Indicated that one of the challenges of engineers is to develop processing techniques and alternative feedstock sources to improve the energy yield, lower environmental impact, and not compete with food.

Indicated that preparation in many areas, including alternative energy and bioprocessing, is deficient in program.

** Final note- indicated that program needs more advising/ advisors. The academic advising is adequate for navigating through the program, but program needs more "mentorship" of students, to talk about career aspirations more than just having a brief discussion of requirements. Recommends getting more faculty involved in student mentoring.*