


Date: 26 August 2016

To: Kate Miller, Provost and Vice President of Academic Affairs
Anne Alexander, Associate Vice President of Academic Affairs

From: Michael V. Pishko 
Dean, College of Engineering & Applied Science

RE: Computer Engineering Program Review

As per instructions from Academic Affairs, the Computer Engineering B.S. program has been reviewed. This degree program is administered by the Department of Electrical & Computer Engineering. Pursuant to UW guidelines for program review, I recommend the program mentioned above be retained as mission critical. The technology industry, whose workforce needs are met by disciplines such as computer engineering, computer science, and electrical engineering, has been identified by the Governor as a critical growth area in Wyoming's economic diversification efforts. As such, the program should be retained and enhanced to support the state's economy. Economic development and diversification are also key elements of the Tier 1 Engineering Initiative as created by the Wyoming State Legislature and Governor's office.

It should also be noted the department has made student recruitment to both electrical and computer engineering a priority and enrollment has grown significantly for both disciplines this current academic year.

cc: John McInroy, Steve Barrett, Megan Barber, File

Academic Program Review
Report Template
University of Wyoming
Office of Academic Affairs
March 2016

(adapted from SDSU)

Deans and Directors who administer an authorized major or course of study approved by action of the Board of Trustees will be responsible for conducting program reviews. Four key elements should be addressed in each academic program review: (1) Program Demand, (2) Program Quality, (3) Mission Centrality, and (4) Cost.

For each program that is reviewed, a recommendation will be made by the Academic Dean to the Vice President of Academic Affairs.

Instructions: Please provide the following information:

Title of Program/Specialization: Computer Engineering
Indicate whether undergraduate or graduate program/specialization: Undergraduate
Department and College: Electrical and Computer Engineering
Department Head Name and contact information (phone, email): John McInroy, 6-6137, mcinroy@uwyo.edu

Part 1 – Program Review

Instructions: Please answer each of the following questions. Items listed under each question have been provided to help guide your response. If an item is not applicable, simply indicate “N/A”.

1. Program Demand*:

(Note: If degrees granted exceeds cutoff, delay review until next round.)

- a. Number of graduates over 5-year period: 136
- b. Enrollment in major/specialization over 5-year period: 32

* Cutoffs for “Low Demand” Designation -- *Degrees Granted*

- Bachelor’s Programs: Average – 5 per year; 5-year total: 25
- Master’s Programs: Average – 3 per year; 5-year total: 15
- Ph.D. Programs: Average – 1 per year; 5-year total: 5

(See APPENDIX A for the types of programs that will be excluded from review.)

Comments from John McInroy, Head of ECE:

According to my graduation figures, computer engineering is above the cutoff to receive “Low Demand” designation. However, it has been listed as a program for review to due low enrollment, so I would like to give some additional information related to it. First, it is a specialization of the more general Electrical Engineering major. As such, it is excluded from

review at this time under Appendix A, rule 2: “Program/Major Specializations.” Here are graduation figures over a five year period (CPEN=Computer Engineering; EE=Electrical Engineering):

Semester	Total CPEN grads	Total EE grads
Fall 2010	4	9
Spring 2011	2	13
Fall 2011	1	12
Spring 2012	4	13
Fall 2012	4	7
Spring 2013	3	8
Fall 2013	4	8
Spring 2014	5	13
Fall 2014	2	9
Spring 2015	3	12
Totals	32	104

5 year Program Total: 136

About fifteen years ago, the “Electrical Engineering degree with a Computer Option” was modified slightly to become a separately accredited “Computer Engineering” degree. Over the past few years, the demand lessened, resulting in lower graduation rates as seen in the table above. However, significantly higher enrollments have been occurring during the past two years, so this trend has already reversed. Last academic year, there were 24 freshmen alone who enrolled in computer engineering; this year, 19 more freshmen have enrolled in computer engineering.

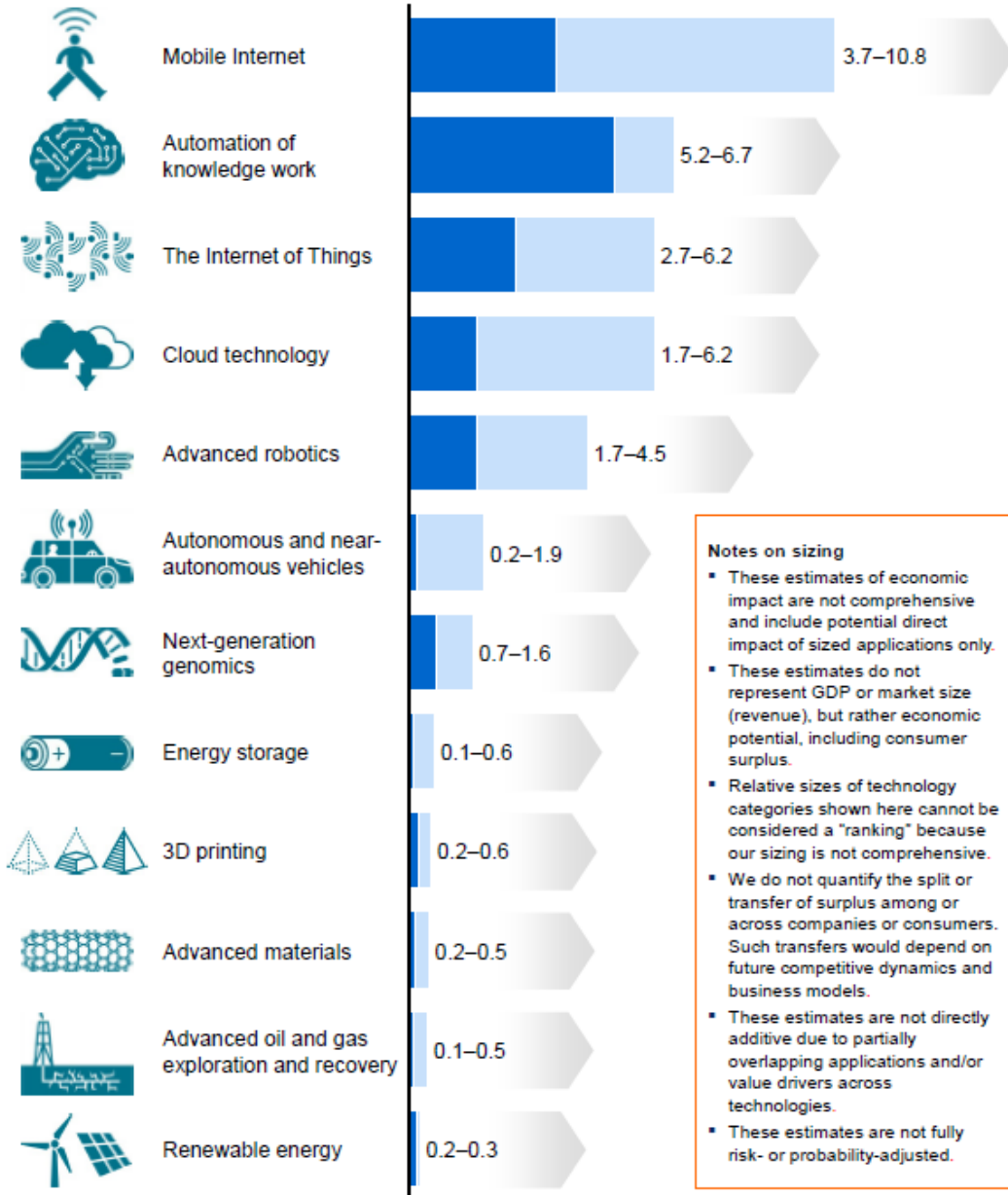
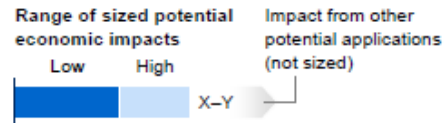
The computer engineering degree is offered at almost no extra cost beyond that required to offer the main electrical engineering bachelor of science. There are no courses that are taken exclusively by computer engineers. Computer engineering majors take a blend of mainstream electrical engineering and computer science courses. All of the courses which are most closely related to computer engineering are taken in larger numbers by straight electrical engineering or computer science majors. To the best of my knowledge, none of these courses has been ever been under-enrolled (had less than 10 students) when offered.

Exhibit E3 below illustrates the results of a 2013 Global McKinsey Institute study. Note that electrical and computer engineering is the foundation for the top six of twelve most impactful technologies. Furthermore, it is important for all twelve of those technologies. Consequently, a bachelor of science degree in computer engineering is currently one of the highest paid four year degrees, and this is anticipated to continue into the foreseeable future.

Exhibit E3

Estimated potential economic impact of technologies from sized applications in 2025, including consumer surplus

\$ trillion, annual



- Notes on sizing**
- These estimates of economic impact are not comprehensive and include potential direct impact of sized applications only.
 - These estimates do not represent GDP or market size (revenue), but rather economic potential, including consumer surplus.
 - Relative sizes of technology categories shown here cannot be considered a "ranking" because our sizing is not comprehensive.
 - We do not quantify the split or transfer of surplus among or across companies or consumers. Such transfers would depend on future competitive dynamics and business models.
 - These estimates are not directly additive due to partially overlapping applications and/or value drivers across technologies.
 - These estimates are not fully risk- or probability-adjusted.

SOURCE: McKinsey Global Institute analysis

2. Program Quality: Is the program of high quality?

a. Program accreditation

- i. For programs currently accredited include:
 1. Name of accrediting body/organization
 2. Date most recently accredited
 3. Next reaccreditation date
 4. List recommendations from most recent visit and progress to date.
- ii. For programs seeking accreditation include:
 1. Name of accrediting body/organization
 2. Timeline for seeking accreditation
- iii. For all other programs include:
 1. Date of most recent Academic Program Review (APR)
 2. List of recommendations from the most recent APR and progress to date.

(Note: For first-time reviews, include N/A in response.)

b. Credentials of faculty

- i. Include a list of all faculty by name, highest degree and discipline of highest degree.
- ii. Also, include a breakdown by gender and ethnicity.
- iii. Grants awarded to academic personnel: Previous 5 years
- iv. Grants submitted by academic personnel: Previous 5 years
- v. Publications/presentations by academic personnel
- vi. National/international awards
- vii. Other

c. Program reputation

- i. If program is ranked, include rank and by what organization.
- ii. Include a brief description of any other indicators of program reputation such as demand (e.g. waiting lists or over enrollment) for admission into program, employer data/feedback, etc.

d. Curriculum of major or specialization

- i. Include a list of courses by prefix, number, title required in the major or specialization (do not include general education course unless required as part of the major requirements.)

e. Distance delivery of program/major

- i. Note if the program is offered online and/or at one of the off-campus attendance centers (e.g., UW-Casper)

f. Quality of Assessment Plan/data

- i. Include a brief description of the program assessment plan and how the data are used to inform decisions related to program quality and student learning.

g. Strategic Plan

- i. Include a brief description of any plans for the program or specialization that appear in the college/department strategic plan (i.e., facilities upgrades, curriculum changes, on-line or off-campus delivery, enrichment learning opportunities, etc.)

h. Other:

3. Mission Centrality: Does the program advance the mission of UW including institutional strategy?

- a. Describe how the program supports the mission, vision and strategic goals of UW.
- b. Describe how the program contributes to other programs across campus (i.e., general education courses, minor or support courses, interdisciplinary program, etc.)
- c. Include placement data for graduates and indicate if graduates are working in the field or not.
- d. Describe the uniqueness or duplication of this program across the UW.
- e. Other:

4. Cost: Is the program financially viable?

- a. Ratio of student credit hours per FTE
- b. Direct instructional expenditures:
 - i. Per student credit hour
 - ii. Per total degrees awarded
 - iii. Non-personnel expenditures per total academic FTE
- c. Course enrollment
 - i. Number of classes falling under University minimums
 - ii. Lower-division courses falling under University minimums
- d. Other instructional cost drivers, such as:
 - i. Section fill rates
 - ii. Course completion rates
 - iii. Curricular complexity
 - iv. Faculty course load
- e. Research expenditures per tenured/tenure-track FTE (and other academic personnel, where appropriate)
- f. Compare your data to national benchmarks (Delaware data)
- g. Other:

Part II - Recommendations

Instructions: *After the review is completed, the Dean in consultation with the Department Head will select one of the following recommendations. In the justification, address each of the items associated with the recommendation.*

1) Retain Due to Critical Need

- a) A college may recommend that a degree program be retained due to its ability to fulfill a critical workforce need or shortage area for the state.
- b) Justification for retaining due to critical need must include:
 - i) Explanation of why the program is important to the University/State/region
 - ii) Description of specific steps (already taken and/or planned) to increase enrollment and graduate production;
 - iii) Preliminary outcomes of steps taken.

2) Retain with Further Review Required

- a) A college may request that a program be retained for further review for those degree programs that serve a specific function central to the mission of the college or university.
- b) Justification for retain due to further review must include:
 - i) Explanation for how the program is central to the university's mission and the benefit to the system;
 - ii) Description of specific steps (already taken and/or planned) to increase enrollment and graduate production;
 - iii) Preliminary outcomes of steps taken.

3) Consolidate with Another Program within College

- a) A college may request that a program be consolidated with a similar program on campus that achieves similar degree requirements.
- b) Justification to consolidate with another program on campus must include:
 - i) Explanation for how the degree requirements for the two programs warrant consolidation;
 - ii) Evidence that the consolidation will meet graduate production thresholds, or specific steps to increase enrollment to meet production thresholds;
 - iii) Preliminary outcomes of steps taken.

4) **Consolidate with Program(s) between Colleges/campuses (e.g., UW/C)**

- a) Two or more colleges may request that similar degree programs be consolidated to maintain equivalent degree programs.
- b) Justification for retaining due to cross-college consolidation must include:
 - i) Explanation for how the consolidated programs will collaborate (e.g., sharing of required courses, shared faculty, etc.) to maintain graduate production thresholds;
 - ii) Evidence that multi-college collaboration will meet graduate production thresholds, or specific steps to increase enrollment if merging programs fails to meet production thresholds;
 - iii) Preliminary outcomes of collaboration between colleges.

5) **Terminate**

- a) A college may request that a program be terminated due to limited graduate production, lack of student interest, shifts in a given field of study, or continued declines in major enrollments.
- b) If the exigency for termination results from the program productivity review process then a brief justification to terminate a program should be included. Such a justification must include:
 - i) Explanation for the decline in graduate production in the degree program;
 - ii) Intended timeframe for submitting a program termination request to the Board of Trustees for their consideration;
 - iii) Expected timeline to meet teach-out requirements established through the regional accrediting body.

APPENDIX A

“Low Productivity” Programs Excluded from Review Process

- 1) **Major Program Modifications**
 - a) Degree programs that have undergone recent program modifications that adversely impact graduate production for a college.
 - b) Modifications traditionally include programs that have undergone recent name changes during the reporting window that result in two equivalent degree programs.
- 2) **Program/Major Specializations**
 - a) Degree programs that have one or more specializations which reduce the total number of graduates.
 - b) The exclusion may apply only for those specializations where the combination results in graduate production that meets the established threshold for the degree.
- 3) **Terminated Programs**
 - a) Degree programs that have been inactivated during the reporting period, but still depict graduates that fall below the established thresholds.
 - b) Terminated programs will remain on the Program Productivity Report until inactive programs have completely cycled through the established reporting period.
- 4) **New Programs**
 - a) Degree programs that have been activated within the past 7 years resulting in limited graduate production due to program implementation.
 - b) Institutional review may be requested prior to the 7th year if graduate production is not scaling to the required thresholds for the degree level.

