

Annual Program Quality Report – EE PhD

The data used for comparison is for the peer and the benchmark institutions of the UH. This data is obtained from The National Academic Press (<http://www.nap.edu/rdp/>) and is summarized in Appendix B.

- 1. What sorts of careers are available to your graduates? Related to this, what is the impact of your graduates, locally, nationally, and internationally? of special importance is placement data, which we do not have and will be required to provide in the near future by WASC. Please provide a list of your graduates over the past five years and where they are working.**

At this point, complete placement data is not available. Based on faculty survey and using online resources such as LinkedIn, some incomplete placement data for the period May 05-May 10 is obtained; see Appendix A. The primary source of employment for EE PhD graduates is researcher positions in industrial research centers, for example, IBM Research. A smaller number of EE PhD graduates pursue academic positions, typically by first taking post-doctoral research positions in universities. Although it is hard to predict the career trajectories of the recent graduates, many of the outstanding EE graduates in the past have been very active in both academia and industry, including a number of IEEE fellows and high-profile industry leaders.

- 2. Why is your program important? That is, what is the significance of your program (to the University, State, and society)?**

The EE PhD program at the UH is the only such program in the State of Hawaii for a very long time to come even if there are other undergraduate programs in EE. The State is interested in developing high tech industry and one of the most important requirements for this is to have highly qualified workforce in areas such as EE. Hawaii has a number of local technology companies, most of whom employ EE graduates with advanced degrees: Oceanit, Archinoetics, Spectrum Photonics, Referentia, Novasol, TeraSys, Kai Medical, Sopogy, Spirent. Larger entities that also employ EE graduates with advanced degrees include Pearl Harbor Naval Shipyard, SPAWAR, Lockheed Martin, HECO, SAIC, BAH. All of these companies and governmental agencies, large, and small, contribute economically to Hawaii's tax base, provide employment for its citizens, and diversify Hawaii's economy. The EE graduate program produces highly qualified workforce in EE for the State of Hawaii. In addition, Hawaii depends upon the built environment for its existence and way of life. Electrical Engineering is an important component of this built environment, for example, the electric power supply and the use in the State. As a result, the graduate studies, instruction, and research in the EE graduate program contribute significantly to the well-being of the people of Hawaii.

Regarding the significance of EE graduate program to the University, many of the science disciplines in the University need engineering graduate students for their programs and EE is definitely one of the areas of interest. A large percentage of EE graduate students are supported by extramurally funded research assistantships from

corporate and federal grants. The associated return on overhead provides a source of extramural revenue for the University. These students also are co-authors on publications and are co-inventors on invention disclosures, all of which raise the level of prestige of the University as a whole.

3. How is the mix of students (local, national, and international; gender and minority status) appropriate? If it is not appropriate, what corrective steps will you take?

The UH data used in this question is for the period May 05-May 10.

The data available does not distinguish students in terms of local versus nonlocal.

In terms of legal status, 29% of the EE PhD graduates at the UH are citizens or permanent residents. It is assumed that the citizens and the permanent residents are the domestic students and the remaining students are the international students. The percentage of the international EE PhD graduates to the total number of EE PhD graduates at the peer and the benchmark institutions has a wide range, which is 46.4% - 89.1%. The percentage of the international EE PhD graduates at the UH is 71% and well within the range of the peer and the benchmark institutions. Therefore, the number of international EE PhD graduates at the UH is quite appropriate.

In terms of gender, 24% of the EE PhD graduates at the UH are females. This percentage at the peer and the benchmark institutions ranges from 10.0% to 32.3%. The percentage of the female EE PhD graduates at the UH (24%) is well within range of the peer and the benchmark institutions. Therefore, the number of female EE PhD graduates at the UH is quite appropriate.

In terms of minority status, the UH website <http://manoa.hawaii.edu/ovcaa/mir/pdf/CDS1011.pdf> states that the minority faculty includes faculty who designate themselves as Black, non-Hispanic; American Indian or Alaska Native; Asian, Native Hawaiian or other Pacific Islander, or Hispanic. In the absence of any other definition, the same definition is used in this report for the students. The distribution of the EE PhD graduates in terms of their ethnicity is given in the table below. The ``NRA'' status does not indicate any ethnicity and therefore it is not taken into account. Of those 8 EE PhD graduates at the UH with known ethnicities, 4 (in other words 50%) belong to the minority groups. Although this suggests that the minority groups are well-represented in the EE PhD program at the UH, the data is probably not statistically significant. Furthermore, the definition of the minority status in the data available for comparison does not match the UH definition. In sum, more data is clearly needed to draw valid conclusions on the representation of the minority groups in the EE PhD program at the UH.

| Ethnicity | Number of EE PhD Graduates |
|---------------------------------|-----------------------------------|
| Japanese | 1 |
| Mixed Asian or Pacific Islander | 1 |
| Middle Easterner | 1 |
| Chinese | 2 |
| Caucasian | 3 |
| NRA | 13 |

4. **How is the number of students of the program appropriate in terms of faculty and other resources? Do multiple graduate degree programs compete for resources? If your program has too few or too many students, what corrective steps will you take?**

The EE Department has a total of 21 faculty. The recent doctoral enrollment in EE was as follows:

| | |
|------------|----|
| Fall 2007: | 29 |
| Fall 2008: | 28 |
| Fall 2010: | 31 |
| Fall 2011: | 31 |
| Fall 2012: | 31 |

Therefore, on the average, EE PhD program had 1.4 students per faculty. The EE PhD student faculty ratio at the peer and the benchmark institutions ranges from 0.8 to 3.9. This shows that the number of students in the EE PhD program is not unreasonable. It should also be pointed out that the above comparison is conservative from the UH perspective because one EE associate professor is at 0.5 FTE, one full EE professor, Vassilis Syrmos, is currently the Associate Vice-Chancellor of Research and Graduate Education, and one full EE professor, Peter Crouch, is the Dean of the College. Furthermore, no statistics are available at this point, the EE Departments at the peer and the benchmark institutions probably have access to more non-faculty resources such as Teaching Assistantships. The EE Department is still engaged in enhanced recruiting, developing brochures, increasing GA stipends, and building its research funding base. Finally, the EE MS and the EE PhD programs are complimentary, as opposed to competitive, with each other.

5. **Are you attracting top applicants? What evidence do you have for this in terms of GRE and/or GPA in comparison to other programs here or at other institutions?**

The EE PhD program is attracting top applicants. The average GPA of the students accepted into the EE PhD program for the period 2006-2012 is 3.66.

6. **Why is the amount of time students take from admission to graduation appropriate for your field? Please justify this in terms of national data (peer institutions) for your discipline.**

The UH data used in this question is for the period May 05-May 10. Both the average and mean times to graduate with a PhD degree in EE at the UH is 5.3 years. The median times to graduate with a PhD degree in EE at the peer and the benchmark institutions range from 3.88 years to 6.78 years. The average median time to graduate (averaged over the peer and the benchmark institutions) is 4.89 years with standard deviation 0.87 years. The median time to graduate at the UH (5.3 years) is well within one standard deviation of the average median time to graduate at the peer and the benchmark institutions. In addition, although it may be desired to reduce our graduation times, this reduction must be done without sacrificing the quality of the program. The dissertation research which is arguably the essence of a PhD degree is somewhat open ended and needs to result in original results. In sum, the EE PhD graduation times are justifiable, especially in view of the fact that some of the EE PhD students completed their studies on a part-time basis and the fact that the time to a PhD degree is inherently a volatile statistic.

7. Is retention a problem for your program in terms of too many students failing to complete their degrees within your program? If so, what are your plans to address this?

The graduation rate for the EE PhD students admitted between Fall 1992 and Summer 2002 is 65.3% (29.2% ended up graduating in a different field or degree). The average completion percentages of EE PhD students in 6 years or less at the peer and the benchmark institutions range between 23.2% and 82.6%. The EE PhD program at the UH does not seem to have a retention problem.

Appendix A

Placement Data

| Name | Date | First Employment | Current Employment |
|--------------------------|-------------|----------------------------------|------------------------------------|
| Zhang, Xiaoxiao | Jul-11 | Global Foundries, NY | Global Foundries, NY |
| Saint-Georges, Eric | May-11 | Nova Sol | CTO of AOptix in San Jose, CA |
| Lim, Fabian | May-10 | MIT postdoc | MIT |
| Mostafanezhad, Seyed Isa | May-10 | Kai Medical | Kai Medical |
| Lo, Ivy | Dec-09 | Raytheon | Navsea Crane |
| Celik, Nuri | May-09 | University of Hawaii | University of Hawaii |
| Massagram, Wansuree | Dec-08 | Naresuan University | Naresuan University |
| Wang, Yige | May-08 | Mitsubishi Electric Research Lab | |
| Park, Byung-Kwon | Dec-07 | Kai Medical | Hyundai Mobis, Korea |
| Shiroma, Grant | Dec-07 | SPAWAR | SPAWAR |
| Jin, Wenyi | Dec-06 | LSI | Xilinx |
| Kim, Wayne | Dec-06 | Raytheon | University of Hawaii |
| Yang, Zigui | Dec-06 | Availink, Inc., Germantown, Md. | Availink, Inc., Germantown, Md. |
| Zhu, Chaopin | Dec-06 | Juniper | Juniper |
| Miladinovic, Nenad | Dec-05 | LSI | Director at Proton Digital Systems |
| Zhang, Juntan | Dec-05 | Availink | Availink |
| Feng, Mu | Aug-05 | Brion Technologies | Brion Technologies |
| Liu, Jianhan | May-05 | Radiospire Networks | MTK |

Appendix B
EE PhD Data at the Peer and Benchmark Institutions of UH
[\(http://www.nap.edu/rdp/\)](http://www.nap.edu/rdp/)

| Institution Name | Median Time to PhD | Percentage of International Students | Percentage of Female Students | Number of Enrolled Students per Faculty | Average Completion Percentage in 6 Years or Less |
|--------------------------------|---------------------------|---|--------------------------------------|--|---|
| U. of Kentucky | 3.88 | 85.0% | 10.0% | 0.8 | 32.4% |
| Oregon State U. | 4.00 | 60.9% | 12.5% | 1.4 | 34.2% |
| U. of Central Florida | 4.00 | 76.9% | 23.1% | 3.9 | 82.6% |
| U. of Illinois at Chicago | 4.00 | 86.6% | 13.3% | 3.2 | 26.4% |
| U. of Tennessee | 4.00 | 89.1% | 23.6% | 1.1 | 66.2% |
| U. of North Carolina Charlotte | 4.50 | 64.5% | 32.3% | 0.8 | 29.4% |
| U. of Washington | 4.50 | 52.5% | 20.7% | 1.1 | 55.9% |
| U. of Colorado at Boulder | 4.57 | 46.8% | 13.8% | 2.0 | 62.0% |
| U. of California-Irvine | 4.70 | 80.5% | 19.5% | 2.5 | 25.3% |
| U. of Iowa | 4.70 | 66.7% | 10.5% | 1.1 | 33.7% |
| U. of New Mexico Main Camp. | 4.70 | 74.4% | 18.0% | 3.9 | 61.7% |
| Colorado State U. | 4.83 | 76.6% | 14.9% | 2.5 | 41.7% |
| U. of California-Davis | 4.85 | 46.4% | 21.0% | 2.6 | 39.3% |
| U. of Arizona | 5.00 | 83.9% | 14.3% | 1.5 | 61.3% |
| U. of Utah | 5.40 | 65.1% | 20.6% | 0.9 | 46.7% |
| U. of South Florida | 6.00 | 69.3% | 11.1% | 2.0 | 42.8% |
| U. of California-San Diego | 6.25 | 59.1% | 14.9% | 3.5 | 30.8% |
| U. of Pittsburgh Pittsburgh | 6.30 | 68.2% | 25.0% | 0.8 | 37.0% |
| Mississippi State U. | 6.78 | 73.7% | 13.2% | 1.1 | 23.2% |