Graduate Degree Program Strategic Assessment
Department of Electrical and Computer Engineering, September 2009
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Mission:
The ECE Department contributes to the three-fold mission of the College and University to create, preserve, and disseminate knowledge by maintaining strong and highly interactive graduate programs and by carrying out high quality research in a limited number of focused areas.

Major Strength:
- Association with a number of UI research centers (CCAD, IIHR, CBCB, IIBI, PPC, HCCC, etc.)
- Interdisciplinary and collaborative character of the ECE graduate program – producing graduates who are uniquely qualified to work in the modern interdisciplinary and multi-cultural world
- Very highly ranked graduate programs in medical imaging and bioinformatics
- 100% ECE graduate students financially supported
- 100% post-graduation placement of our graduates with MS and/or PhD degrees

Admission Processes and Criteria:

Student Demand and Recruitment

<table>
<thead>
<tr>
<th>Year</th>
<th>Applicants</th>
<th># Offers</th>
<th>% Offers</th>
<th>MS # enrolled</th>
<th>PhD # enrolled</th>
<th>Recruiting success MS+PhD</th>
<th>MS recruiting</th>
<th>PhD recruiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>154</td>
<td>15</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>56%</td>
<td>86%</td>
<td>33%</td>
</tr>
<tr>
<td>2005</td>
<td>118</td>
<td>23</td>
<td>16</td>
<td>9</td>
<td>7</td>
<td>70%</td>
<td>64%</td>
<td>78%</td>
</tr>
<tr>
<td>2006</td>
<td>146</td>
<td>18</td>
<td>9</td>
<td>6</td>
<td>3</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>2007</td>
<td>182</td>
<td>32</td>
<td>22</td>
<td>10</td>
<td>12</td>
<td>69%</td>
<td>56%</td>
<td>86%</td>
</tr>
<tr>
<td>2008</td>
<td>188</td>
<td>23</td>
<td>14</td>
<td>2</td>
<td>12</td>
<td>61%</td>
<td>67%</td>
<td>60%</td>
</tr>
</tbody>
</table>

The entrance standards of the Electrical and Computer Engineering Program are:

1. For the M.S. program a minimum GPA of 3.0 on a four-point basis is required on all courses in electrical and computer engineering, mathematics and physics. For the Ph.D. program, a minimum graduate GPA of 3.25 is also required.
2. An M.S. student with a GPA less than 3.0, but better than 2.5 on courses in electrical and computer engineering, mathematics and physics may be admitted on a probationary status.
3. Students with baccalaureate degrees and strong credentials in related areas (e.g., physics, mathematics and computer sciences) may be admitted. In such cases, additional course work without graduate credit may be required.
4. All new foreign students scoring less than 550 on the Test Of English as a Foreign Language are required to take an examination administered by the Linguistics Department upon arrival. Any remedial courses recommended by the Linguistics Department upon the result of this examination must be completed at the earliest opportunity.
5. All applicants must meet the minimum GRE requirements (470-V, 780-Q, 4-W).

Success in enrolling highest quality students admitted
The overall success rate in attracting the highest quality students admitted is 63%. This percentage has been more or less stable over the past 5 years. More importantly, the success rate in admitting highest quality PhD students is showing an increasing trend from 33% 5 years ago to 86% and 60% in the past 2 years. The following table shows our success in enrolling a diverse graduate student body with a focus on attracting female students, which nationwide represent a very significant minority in electrical and computer engineering (we consistently exceed the average of 12% female students in electrical engineering Ph.D. programs nationwide).
### Year/Citizenship/Female/Male

<table>
<thead>
<tr>
<th>Year</th>
<th>Citizenship</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>USA (7), China (3)</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>2005</td>
<td>USA (10), India (3), Turkey (1), Jordan (1), China (1)</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>2006</td>
<td>USA (5), China (3), India (1)</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2007</td>
<td>USA (5), China (7), Iraq (1), Iran (1), India (6), Turkey (1), Malaysia (1)</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>2008</td>
<td>USA (2), China (7), India (4), Iran (1)</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>

### Financial aid commitments

81% of ECE graduate students receive full financial assistance from ECE, with the remaining 19% employed in industry. The following table shows the numbers of graduate student assistantships awarded to graduate students over the past 5-year period. Currently, about 27% of ECE assistantships are funded internally (teaching) while the remaining 73% come from extramural research sources. Importantly, the percentage of reliance on intramural sources has decreased from 42% five years ago to the current 27%.

<table>
<thead>
<tr>
<th>Assistantships</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td># TAs (% is TA/RA split)</td>
<td>19 (42%)</td>
<td>21 (41%)</td>
<td>18 (38%)</td>
<td>21 (39%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td># RAs (% is TA/RA split)</td>
<td>26 (58%)</td>
<td>30 (59%)</td>
<td>29 (62%)</td>
<td>33 (61%)</td>
<td>38 (73%)</td>
</tr>
<tr>
<td>Employed outside UI</td>
<td>20</td>
<td>15</td>
<td>16</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Total ECE supported</td>
<td>45 of 65 (69%)</td>
<td>51 of 66 (77%)</td>
<td>47 of 63 (75%)</td>
<td>54 of 67 (81%)</td>
<td>52 of 64 (81%)</td>
</tr>
</tbody>
</table>

### Program Outcomes:

#### Degree completion and time to degree

The degree completion rate for students enrolled from 1996-2001 was 37% and the average time to PhD degree was 5.1 years (over past 5 years). The time-to-completion is one of the shortest among the Math/Physics/Engineering programs (range from 4.8 to 6.9 years). The relatively low completion rate during 1996-2001 was caused by a large number of PhD students from industry (mostly Rockwell Collins) who have a much higher attrition rate than traditional in-house students. When analyzing more recent data, we were happy to see that for 21 students who entered in 2001, 12 were awarded PhD (57%) with median TTD of 5.3; 4 are still enrolled; 4 left with MS, and only one left without any degree. Similarly, out of 3 students who entered in 2002, 2 were awarded PhD (67%) with TTD of 4.6 and 1 left with MS. For these more recent years, the completion rates are very significantly better than the period of 1996-2001 suggested.

#### Graduate student fellowships, awards, honors, publications

Over the past 5 years, 6 students received Graduate Assistance in Areas of National Need (GAANN) fellowships. Eleven (11) ECE graduate students received one or more awards in the past 5 years – including the prestigious Michael M. Merckel Best Student Paper award of the 2007 International SPIE Symposium on Medical Imaging – San Diego, Best Poster Award from the same conference in 2004 and 2006, Best Student Paper award of 2008 AGU Fall Meeting - San Francisco, 2006, TA Teaching Excellence Award, 3rd prize in 2004 James Jakobsen Graduate Conference, several Best Graduate Student Poster awards during CoE Research Days, and several Best Graduate Student awards of the Iowa Institute for Biomedical Imaging. We are equally proud of a high publication record of our graduate students supervised by ECE faculty. In total, our graduate students published 39 journal or conference papers over the past 5 years. With 10 faculty members with active research that involves supervision of graduate students, this corresponds to publishing 3.9 papers per faculty member over the five year period in which graduate students directly participated.
Graduate student placements

The most desirable placement for our graduate students after completion of their degrees is either in academia or in industry. Over the past 5 years, 18% of graduates were placed in academic research while 82% were placed in industrial research and development or other industry-related positions. This represents 100% placement of our graduates with MS and/or PhD degrees. The percentage of students hired for industrial positions is the highest of all College of Engineering programs (College range 18-82%). Together with our 100% placement outcome (College range 75-100%), this demonstrates the value of our graduate program. Out of the graduates, 17% were initially and continue being employed in the State of Iowa.

Program Characteristics:

The ECE graduate program has been about the same size over the past decade during which the size of the ECE faculty decreased from 22 to 16 faculty members. In the last several years, the department became home for 3 interdisciplinary faculty with joint appointments in the College of Medicine. Additional 3 faculty members were hired this past year. The ECE department is associated with several Institutes and Centers, including CCAD, IIHR, CBBC, IIBI, PPC, HCCC, and others. As a result of these affiliations, faculty members from other departments, colleges, and universities are frequently participating in graduate research education of our students. Clearly, the interdisciplinary and collaborative character of our program, combined with its overall quality, are among its most important assets. The demographics of ECE’s students and the faculty are highly international, with research ties, exchange possibilities, and recruitment potential in China, India, Australia, Austria, Great Britain, Italy, Japan and Eastern Europe.

With the increase in faculty size, the graduate student body has already started to grow and we expect this trend to continue. We expect that the extramural funding to the ECE department will substantially increase over the next 3-5 years and the number of graduate students with extramural support will grow accordingly. The ECE graduate program is currently ranked #58 among Computer Engineering and #69 among Electrical Engineering graduate programs. We are not satisfied with this ranking and are working hard to increase visibility of our graduate program. At the same time, the disciplines of electrical and computer engineering encompass many subfields that are not necessarily reflected in the overall national rankings. In particular, the ECE’s programs in medical imaging and bioinformatics are of exceptionally high quality.

Conclusions:

The following summary of the ECE graduate program represents its main distinguishing features:

- 100% post-graduation placement of our graduates with MS and/or PhD degrees
- Continuously increasing number of yearly-enrolled PhD students
- Increasing success rate in admitting highest quality PhD students
- 81% of ECE graduate students receive financial assistance
- 19% of ECE students are employed in industry (usually full-time and their studies supported by the employer or on internships) – this gives a total 100% ECE graduate students financially supported
- Large number of students receiving prestigious graduate student awards
- Association with a number of UI research centers (CCAD, IIHR, CBBC, IIBI, PPC, HCCC, etc.)
- Interdisciplinary and collaborative character of the ECE graduate program – producing graduates who are uniquely qualified to work in the modern interdisciplinary and multi-cultural world
- International demographics of graduate students and faculty
- Very highly ranked graduate programs in medical imaging and bioinformatics
Mission:

Within the broader community at the University of Iowa, to foster efficient and cooperative multidisciplinary and cross-college research and discovery in biomedical imaging, and to improve training and education.

Student Demand

- Currently associated with IIBI:
  - Total of 49 graduate students, 10 are pursuing MS, 39 pursuing PhD
  - BME, 11 students (6 MS, 5 PhD)
  - ECE, 20 students (4 MS, 16 PhD)
  - Internal Medicine, 7 students (0 MS, 7 PhD)
  - Radiology, 11 students (0 MS, 11 PhD)
- Average Research Assistantship stipends and tuition support for RAs in the center
  - FY08-09 ... average stipend $20,175.24 + tuition $4954
  - FY09-10 ... average stipend $21,111.87 + tuition $5230
  - No special fellowships available

Participation of students in national and international conferences

- 2008-09 ... at least 31 student presentations

Other support of graduate students

IIBI Seminar Series: The series is a forum for students, faculty and external investigators to present their research and “work in progress” to the IIBI membership. The series is held every Thursday during the Fall and Spring semesters. Internal relationships have benefited from the IIBI seminar series, which allows researchers to learn about research being conducted at Iowa. This has fostered new internal collaboration.

IIBI Website and mailing list: The IIBI website (http://www.biomed-imaging.uiowa.edu/) serves as an online source of information about the IIBI. IIBI researchers are featured on the main page, which aids in fostering collaboration opportunities with both internal and external investigators. Current news about IIBI members is also featured, as well as information about the weekly IIBI seminars. The IIBI mailing list is an important tool used to communicate with the IIBI memberships. Announcements regarding the IIBI seminars, national and international research meeting opportunities, MS and PhD thesis presentations, and other information are disseminated to the IIBI membership in this way.

IIBI Boot Camp: The IIBI Boot Camp, held at the beginning of the fall semester, is geared toward incoming students and serves to give an overview of the IIBI and its resources available to students.