5. **Program Effectiveness – Outcomes Assessment**

5.1 **Learning outcomes assessment procedures**

5.1.1 *Recruitment of Quality Graduate Students*: Graduate applicant achievement data (GRE scores, GPA, TOEFL scores) are compiled each year to obtain relative indications of the quality of incoming students. Basically, since our entry classes are small (<10 new students per year) this is an exercise in assessing differences of numbers in underpowered cohorts without statistical significance. Total numbers of applicants compared to domestic applicant numbers are monitored to assess our ability to make our program known to potential students. Compared to our close companion department in Bioengineering, we know we do not have the same domestic appeal to prospective graduate students, nor students of the same overall quality.

5.1.2 *Success of Enrolled Students*: Student progress in the program is reviewed annually by the faculty. Student overall GPA, grades in Department core classes, and progress in their research is covered. The Ph.D. comprehensive examinations are our mid-program assessment of student progress. Within six months of completing their core class work, students must take comprehensive examinations to evaluate their performance on questions related to the core curriculum. Changes to Department policy now compel students to rapidly form their supervisory committees with their comprehensive exam completion. This allows students to have an active engaged expert committee accessible to them and with whom they can meet to apprise them of their progress and receive specific technical direction and support. All students are required to meet with their supervisory committee annually and present full research updates.

5.1.3 *Pedagogical Success of Faculty*: Faculty success in formal educational efforts is assessed through required anonymous student class evaluations and required peer teaching reviews. Data are reviewed annually by the department and recommendations for changes are made through the Chair. Collective student input on Department function and academic concerns are also handled very effectively through the Student Advisory Committee (SAC) as a peer advisory group for fellow students, and an important student interfacing group with the Chair and faculty. Our Department has empowered the SAC to represent student concerns to the faculty by attending each faculty meeting and addressing issues in a regular forum. The SAC is also instrumental in coordinating student feedback during the RPT process and for helping to organize functions within the Department that enhance professional and collegial opportunities for students, faculty, and staff. The Chair has provided SAC a budget to invite student-initiated seminar speakers and run social events. This has produced an impressive list of guests on campus.
The Department also reviews as needed our core curriculum to make sure that desired objectives are being achieved. In this regard, the core curriculum has been revised twice in the past 7 years.

5.1.4 Overall Success and Satisfaction of Program Graduates: After completion and final defense of their thesis, all students hold an exit interview with the Department Chair to discuss their impressions of our program and make recommendations for change. The Department maintains an active alumni listing to attempt to track graduates’ employment opportunities, success, and career trajectories. This is in fact more difficult to follow than stated. Auto-responses to frequent alumni list-serve e-mails indicate a lot of broken connections and changing e-mail addresses without any good ability to re-locate “lost alumni.” Our electronic and printed newsletters and announcements often are returned to sender without forwarding as time distances the alumni from the Department. Nonetheless, we do receive feedback from recent graduates regarding their transitions into their first professional experiences outside of the program. We routinely use the Department website to highlight the success of our graduates and current students.

Our Department hosts an Annual Alumni Breakfast or Lunch at the AAPS meeting. Of 157 Ph.D. alumni to date, we have had up to 50 people attending this at the AAPS meeting. To maintain connections with our 157 alumni, we have opted to continue meeting during the APS Annual Meeting each year. To allow for a more intimate exchange of alumni our department has switched from hosting a breakfast at the convention hall in lieu of a nice restaurant nearby. Alumni donations are regular enough in some years to allow the Department to establish an Alumni Fellowship for students, along with an annual award (The Fox Award for outstanding service to the department) which is awarded based on nominations and votes by the current student body. We acknowledge our limited ability to track our graduates. This has resulted in the College’s first comprehensive effort to compile a College alumni directory through a third-party “search” resource in 2011. In 2018 we will begin tracking via faculty lists of alumni, and tracking by faculty.

5.2 Outcomes assessment feedback

Feedback from student class reviews, student exit interviews, faculty peers who teach our students, and direct communication with academic and industrial groups that hire our students are all used to assess the educational success of our program.

Specifically, faculty teaching is monitored also by the Learning and Teaching Committee in the College, which occurs yearly for pre-tenured faculty. There are no standard requirement for tenured faculty. Faculty are evaluated by 2 peer faculty members and are provided written (and often oral) feedback on their teaching, using a standardized form.
that the College uses for evaluation. These forms and comments from the Learning and Teaching Chair are sent to the faculty member, and become part of the RPT file. Post-tenure reviews are less frequent, but faculty are also reviewed in this same way.

Student evaluations are performed for each class that a faculty member teaches a significant proportion of. These evaluations are also used for self-assessment, and become part of the RPT file (or post-tenure review file).

### 5.3 Degree completion data

See Table 5.1 for graduate degree completion/attrition data.

**Table 5.1: Graduate Degree Completion/Attrition Data**

*Department of Pharmaceutics and Pharmaceutical Chemistry 2011-2018*

<table>
<thead>
<tr>
<th>Entering Student Cohort Academic Year</th>
<th>Number of students newly enrolled in doctoral program</th>
<th>Number of students in cohort who left before completing doctoral degree</th>
<th>Number of students in cohort who completed doctoral degree</th>
<th>Average time to complete doctoral degree</th>
<th>Number of students in cohort remaining in doctoral program</th>
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</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>25</td>
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<tr>
<td>2012-13</td>
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<td>5</td>
<td>21</td>
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<tr>
<td>2013-14</td>
<td>5</td>
<td>1</td>
<td>8</td>
<td>5.5</td>
<td>22</td>
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<tr>
<td>2014-15</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>5.5</td>
<td>17</td>
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<tr>
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<td>3</td>
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<tr>
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<td>6</td>
<td>17</td>
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<tr>
<td>2017-18</td>
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<td>0</td>
<td>3</td>
<td>6</td>
<td>13</td>
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</tbody>
</table>
5.4 Employment

Our graduates fall into the following job placement categories:

- 49% of our students accept national industry jobs;
- 10% of our students accept international industry jobs;
- 34% of our students accept academic positions (79% as postdocs – 19% as international faculty);
- 6% of our students accept positions in Federal government.

The future of the drug delivery area for technology advancement and contributions to improving modern pharmaceuticals is bright: Many market forecasts show impressive growth potential in drug delivery technologies, spurred by the strategic interests in shielding profitable drugs from generic competition and extending patent lifetimes. The pharmaceutical industry is growing globally due to increased attention to the medical demands of an increasingly elderly population demographic, corresponding rise in chronic diseases, improved access to emerging markets in developing countries, as well as the growing awareness of illnesses through improved diagnoses. According to a report, in 2017 the global pharmaceutical market reached US $996 billion, with an expected annual growth of 5% through 2020.

While one could argue about the impact of reimbursement and payor-payee changes being considered for drugs affecting marketability and employment, modern therapeutics and their impact to healthcare represent a growing and profitable global business sector. New biopharmaceutical products (biotechnology drugs) require careful formulation and unique stability assurance to guarantee their markets and success. These developments provide a secure job environment for our graduates. Most of our alumni are found in the American pharma industry, although an increasing number of Asian graduates are finding academic positions in their home countries now. Eventually the lopsided fraction of alumni working in industry might rebalance a bit toward more academic positions. But the overwhelming number of our graduates seeks industrial pharma employment. A convincing, competitive and comprehensive set of technical and professional qualifications is a must for anyone seeking a position in the pharmaceutical industry. We believe we instill many of these traits into our graduates to allow them to be competitive in this global arena.