

**Assessment Findings and Curricular Improvements**  
**School of Engineering**  
**Master's and Doctoral Programs**

Graduate enrollments at the Master's and PhD levels in AY 2015-16 remained consistent with those of the previous year, AY 2014-2015, and the preceding five-year period covered in the full 5-year assessment report completed in September 2014. In particular, for the Master's program, the School of Engineering enrollment was 98 students in Fall 2015, compared to 100 in Fall 2014 and an average of 97 over the previous 5 years. The enrollments are broken down by: biomedical engineering = 11 students; civil engineering = 17 students; electrical engineering and computer science = 10 students; mechanical engineering = 11 students; materials science and engineering = 12 students; and engineering management = 37 students. For the doctoral program, the School of Engineering enrollment of 88 students in Fall 2015 was similar to the Fall 2014 enrollment of 86 and the previous five-year average of 85. The enrollments are broken down by: biomedical engineering = 15 students; civil engineering = 18 students; electrical engineering and computer science = 45 students; and mechanical engineering = 10 students. Total graduate enrollment in the School of Engineering for Fall 2015 was 194 students, down slightly from 201 in Fall 2014 and the previous five-year average of 200 students. (Note: the total enrollments include non-degree seeking students who are taking graduate level courses at off-campus facilities.) The enrollments are broken down by: biomedical engineering = 27 students; civil engineering = 41 students; electrical engineering and computer science = 56 students; mechanical engineering = 21 students; materials science and engineering = 12 students; and engineering management = 37 students.

Each of engineering's graduate programs (i.e. biomedical, civil, engineering management, electrical and computer science, mechanical, and materials science and engineering) conducts reviews of its programs annually. The School of Engineering has adopted a unified assessment process using common assessment processes, tools, and analysis methods all engineering programs for evaluating student learning outcomes.

**ASSESSMENT MEASURES**

The School of Engineering uses the following measures to assess student learning outcomes:

- Review of coursework by major professors, including: exams, homework assignments, course projects (as appropriate), and reports (as appropriate)
- Review of course content by department chairs, including topics covered and tools/techniques taught
- Student course evaluations
- Comprehensive Exam (for doctoral students)
- Evaluation of theses (if applicable) by major professors and readers using criteria: originality of work, quality of experimental design, accuracy of data analysis, quality of written report, and oral presentation (see rubric for graduate theses)

### **ASSESSMENT FINDINGS**

For AY 2015-16, 16 students took and passed the PhD comprehensive examination (100% pass rate). All students are still continuing in their respective programs. The passing rates for the PhD Comprehensive Exams support the quality and rigor of the preparation of our students and confirm that students are achieving the expected program learning outcomes.

In AY 2015-16, 13 students defended doctoral dissertations and were awarded their PhD (100% pass rate). This is an increase from 10 PhD degrees awarded in each of the the previous two academic years.

### **CURRICULAR IMPROVEMENTS FOR MASTER'S PROGRAM AND PH.D. PROGRAMS**

In Engineering, the key core courses for graduate students are ENGR 516 (Computational Methods for Graduate Students) and ENGR 520 (Mathematical Analysis for Graduate Students), which function as the gateway courses in the School. Master's degree students in all programs except Engineering Management are required to take these courses, as are doctoral students who have not had equivalent courses at a previous institution. Recently, a third course ENGR 518 (Experimental Techniques for Graduate Students) was introduced, which some programs (specifically mechanical and civil engineering) have allowed as a substitution for ENGR 516 or 518 (students from all programs are encouraged to take all three courses). Both student and faculty performance are continuously reviewed in all of these courses. ENGR 516 and 520 are offered in both Spring and Fall semesters and typically during Summer as well. ENGR 518 is offered at least once each academic year.

On-campus enrollment numbers in these courses for AY 2015-2016 are as follows:

Course	Fall 2015	Spring 2016	Summer 2016	<b>Total</b>
ENGR 516	38	20	10	<b>68</b>
ENGR 518	-	22	-	<b>22</b>
ENGR 520	11	17	7	<b>35</b>

Note that ENGR 516 was also offered off-campus during Summer 2016 to 9 students at the U.S. Army's Night Vision and Electronic Sensors Directorate at Ft. Belvoir, VA.

In addition to these core courses, each program continuously adapts its graduate-level course offerings to suit demand and capitalize on faculty expertise. Programs have several courses offered regularly every year, others that are offered every second or third year, and yet others that are offered irregularly

as student interest dictates (including newly developed courses).

A new development in AY 2015-2016 is an increase in the number of combined-section courses at 400- and 500- level. In past years, a significant fraction of the enrollment in 500-level (master's) courses consisted of undergraduate students taking courses as program electives. By adding 400-level versions of these courses for undergraduates, the School allows instructors to take advantage of the different grading systems for undergraduate and graduate courses, so that graduate students can be consistently held to the appropriate standard. This trend is expected to continue in future years.