

**New Program Proposal
Master of Science / Master of Engineering
Aerospace Engineering
University of South Carolina**

Summary

University of South Carolina requests approval to offer a new program leading to the Master of Science and Master of Engineering in Aerospace Engineering to be implemented in Fall 2012. The proposed program is to be offered on the University of South Carolina-Columbia campus and online through the College of Engineering and Computing's APOGEE (A Program of Graduate Engineering Education) program.

The Program Planning Summary was submitted to the Commission in May 2011 and reviewed and voted upon favorably without substantive comment by the Advisory Committee on Academic Programs on July 14, 2011. The University of South Carolina Board of Trustees approved this proposal on December 13, 2011. The full proposal was received by the Commission on February 13, 2012.

According to the proposal, the purpose of the proposed program is "to respond to the needs of the expanding [South Carolina] aerospace industry for appropriately educated engineers" and to establish the first aerospace engineering graduate program in the state. The proposed program is a response to recent aerospace industry expansion in the state by companies such as Boeing, ACAS Landing Gear Services, and GE Aviation, as well as the dozens of aerospace industry suppliers which are expected to locate in South Carolina in the near-future.

The proposal indicates that according to Miley & Associates' 2010 report, *The Economic Impact of Boeing in South Carolina*, the Boeing expansion alone is expected to create 6,000 jobs. The proposal also indicates that *Site Selection* magazine estimated that the overall economic impact of the expansion will \$1.4 billion on the state economy. Graduates of the proposed program are expected to find employment opportunities with companies like Boeing, and generally "in the aerospace industry, NASA, government laboratories, consulting engineering firms, and in local, state and federal government agencies—throughout the US as well as in foreign countries."

The U.S. Bureau of Labor Statistics (BLS) indicates that in 2008 there were 71,600 employed aerospace engineers in the United States. BLS projects that this labor force sector will increase by ten percent to 79,100 by 2018. The department adds: "Although the number of degrees granted in aerospace engineering has begun to increase after many years of declines, new graduates continue to be needed to replace aerospace engineers who retire or leave the occupation for other reasons."¹

The proposal provides a table of more than 50 aerospace engineering graduate programs in the United States, including programs at North Carolina State University and Georgia Institute of Technology. Other graduate aerospace engineering program in the Southeast include University of Alabama, Auburn University, University of Central Florida, University of Florida, Mississippi State University, University of Texas-Austin, and Virginia Polytechnic

¹ BLS Occupational Outlook Handbook 2010-11, www.bls.gov/oco/pdf/ocos027.pdf.

Institute. However, should the proposal be approved, University of South Carolina would be the only South Carolina institution to offer any aerospace engineering graduate degree. The proposal states that the proposed program will not seek specialized accreditation. (According to the ABET website, the only aerospace graduate programs in the nation with ABET accreditation are Air Force Institute of Technology and Naval Postgraduate School.)

The proposed Master of Science program will consist of 30 credit hours of course work, which includes six credit hours of thesis preparation. The proposed Master of Engineering program will consist of 30 hours of coursework without a required thesis. Both the proposed Master of Science and Master of Engineering programs will include a five-course core curriculum of 500- and 700-level classes, plus two 700-level elective courses in electrical engineering or chemical engineering, with the option of students taking 500-level and above business course work with advisor or graduate committee approval. In addition to completing a thesis, students in the Master of Science program will be required to submit either one conference paper or one journal paper prior to graduation. Students in both the Master of Science and Master of Engineering program will be required to pass a comprehensive examination to graduate.

The proposed program states that University of South Carolina will include eight new 500- and 700-level courses at University of South Carolina, including the new Master of Science thesis course. All other proposed program courses are currently offered by the College of Engineering and Computing.

According to the proposal, admissions requirements for the proposed program include an undergraduate degree “or its equivalent in engineering, computer science, or a related field from an accredited institution.” Admission will be determined by a variety of components, including GRE score, recommendation letters, GPA and the quality of the applicant’s prior education. The proposal indicates that up to 55% of enrolled students in the proposed program will be distant learners. The proposal also indicates that current University of South Carolina undergraduate mechanical, electrical or chemical engineering students may be permitted to enter the program through the Accelerated Master’s program, “where students with a GPA of 3.5/4.0...may take up to three graduate courses while pursuing their undergraduate degrees.”

The proposal anticipates there will be 20 new students (6.5 FTE) in the program’s first year, increasing to 30 students (11.6 FTE) in the second, 43 in the third year (16. FTE), 55 in the fourth year (22.5 FTE), and 60 in the fifth year (24.0 FTE total). If enrollment and program completion projections are met, the proposed program will meet the Commission’s productivity standards.

The proposal indicates that the proposed program will result in the addition of three new faculty members, one in Mechanical Engineering, one in Electrical Engineering, and one in Computer Science and Engineering. The proposal lists as currently on staff and additionally available to support the program three Mechanical Engineering professors and two Mechanical Engineering assistant professors. Total FTE faculty devoted to the proposed program will be 2.0 FTE in the first year, 3.0 FTE in the second year, and 4.0 FTE in the third, fourth, and fifth years.

The proposal states that “no significant additional costs will be associated with implementing the proposed program beyond the cost of the [three] faculty hires.” The proposal lists \$1,047,500 in additional costs, which will be financed by the estimated FTE revenue generated from the state and from tuition funding. The five-year costs are broken down per annum as follows: \$87,500 in the first year, \$167,500 in the second year, \$297,500 in the third year, \$247,500 in the fourth year, and \$247,500 in the fifth year. These \$1,047,500 in additional costs include \$960,000 for three faculty hires, beginning with \$80,000 in the first year and culminating in \$240,000 in the fifth year. Other costs include \$25,000 for supplies and materials, at \$5,000 per annum for the first five years, as well as \$12,500 for library resources, at \$2,500 per annum for the first five years. A final cited cost is \$50,000 facilities in the third year; the proposal states that this cost will be required to fund “a larger room with teleconferencing facilities...for the delivery of courses via distance education.”

The proposal notes that “no new teaching laboratory space will be needed for the proposed program.” The proposal does, however, mention that new research space has been allotted for aerospace engineering. CHE staff notes that USC has publicly announced the building of a multimillion dollar McNair Center in the Horizon Innovista facility on the Columbia campus which will focus “on the research and education needs of South Carolina's burgeoning aerospace industries” (www.sc.edu/mcnair/).

The chart below shows the proposed budget which will support the proposed program.

| Estimated Costs By Year | | | | | | |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|
| Category | 1st | 2nd | 3rd | 4th | 5th | Total |
| Program Administration | 0 | 0 | 0 | 0 | 0 | 0 |
| Faculty Salaries | 80,000 | 160,000 | 240,000 | 240,000 | 240,000 | 960,000 |
| Graduate Assistants | 0 | 0 | 0 | 0 | 0 | 0 |
| Clerical/Support Personnel | 0 | 0 | 0 | 0 | 0 | 0 |
| Supplies & Materials | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 25,000 |
| Library Resources | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 12,500 |
| Equipment | 0 | 0 | 0 | 0 | 0 | 0 |
| Facilities | 0 | 0 | 50,000 | 0 | 0 | 50,000 |
| Other/Operating | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals by Year | 87,500 | 167,500 | 297,500 | 247,500 | 247,500 | 1,047,500 |

| Sources of Funding | | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------|
| Source | 1st | 2nd | 3rd | 4th | 5th | Total |
| Estimated Revenue Generated from Tuition | 112,680 | 184,440 | 259,860 | 354,375 | 381,600 | 1,292,955 |
| Other State Funding | 0 | 0 | 0 | 0 | 0 | 0 |
| Reallocation of Existing Resources | 0 | 0 | 0 | 0 | 0 | 0 |
| Totals by Year | 112,680 | 184,440 | 259,860 | 354,375 | 381,600 | 1,292,955 |

These data demonstrate that if University of South Carolina can meet the projected student enrollments and contain costs as shown in the proposal, the proposed program will cover costs with revenues it generates beginning in the first year of implementation.

In summary, University of South Carolina is proposing a program leading to the Master of Science and Master of Engineering in Aerospace Engineering. Designed as the state's first graduate degree in the field, the proposed on campus and distance learning program will prepare students who are "pursuing a career in the expanding aerospace industry in South Carolina" and "will attract both new engineering graduates as well as engineers already in the workforce."

Recommendation

The Committee on Academic Affairs and Licensing commends favorably to the Commission approval of the program leading to a Master of Science and a Master of Engineering in Aerospace Engineering at University of South Carolina, to be implemented in Fall 2012 and offered on the University of South Carolina-Columbia campus and through the APOGEE distance learning program, provided that no "unique cost" or other special state funding be required or requested.