Expected Outcome: Competency in Aerospace Sub-Fields

Upon graduation, graduates of the Aerospace Engineering program will have demonstrated an ability to apply knowledge of mathematics, basic science and engineering to solve problems encompassing the four fundamental areas of aerospace engineering: aerodynamics, structures, flight dynamics, and orbital mechanics.

Assessment Method 1: Course Data Collection

Assessment Method Description
Data is collected typically from final exam question in junior level courses that cover the four fundamental areas of aerospace engineering. These courses are assessed every year. A rubric is employed that consists of two performance indicators to determine the extent of the students understanding of the problem ("PI1: Understands Problem") and their ability to solve the problem correctly ("PI2: Execution"). A three point scale is used for each performance indicator within the rubric. A score of 1 corresponds to unsatisfactory, a score of 2 corresponds to meets expectations, a score of 3 corresponds to exceeds expectations. The course instructor performs this assessment for each student in their class.

The success metric is that at least 90% of the students rate scores of either 2 or 3.

The Spring 2013 assessment for this outcome was carried out in AERO 3120, AERO 3230, AERO 3310 and AERO 3610

Findings
The success metric was met on all performance indicators for students in the AERO 3230, AERO 3310 and 3610 courses. In AERO 3120, the success metric was achieved by 86% of the students which is slightly below the target level of 90%

How did you use findings for improvement?
The faculty members responsible for the AERO 3120 course met and
discussed the assessment results. They went back to look at the material coverage in the prerequisite course AERO 2200 and adjusted coverage content to spend additional time on the introductory material associated with the "weakness" area displayed by students in the AERO 3120 course.

Additional Comments

Assessment Method 2: Alumni Senior Exit Survey

Assessment Method Description
A group of three senior alumni with extensive industrial/governmental experience have volunteered for the last 10 years to construct and administer an online, self-assessment survey of our graduating seniors each spring semester. All graduating seniors are required to complete this survey. There are fourteen questions in the survey and one of the questions is "How would you assess your current knowledge of basic aerodynamics, structures, flight dynamics and orbital mechanics"? The students are asked to select a knowledge level by using the numerical scale shown below.

9-10 Excellent
7-8 Very Good
5-6 Average
3-4 Below Average
0-2 Poor

The online survey results are sent directly to this group of alumni and only they see the "raw" survey results. During the summer (after the students have graduated), the alumni members write a summary report of the survey results to present to the department chair.

Findings
For the 2013 survey year, the alumni report included the following statement regarding this outcome
"Overall assessment: Very Good; composite assessment for all students was a 7. Numerical scores ranged from 5 to 10. Assessment indicated a strong confidence in the students' ability to apply the principles studied."

How did you use findings for improvement?
The survey findings show that the department is doing a good job in educating the students in the four fundamental areas of Aerospace Engineering. Over the 10 years that the alumni have been conducting this self-assessment, some very useful information has been collected and forwarded to the department chair. The online survey form
encourages written comments in addition to the numerical scores and several comments over the years have resulted in curriculum changes that have certainly enhanced the undergraduate program. The department chair shares the results of this survey each year with the faculty and the results have always led to a lively discussion and as mentioned above, certainly some improvements to the Aerospace Engineering program.

Additional Comments

Assessment Method 3: Senior Exit Interviews with Department Chair

Assessment Method Description
The department chair conducts an individual interview with each senior in Aerospace Engineering during the semester of their graduation. This interview lasts approximately 15 to 45 minutes and during the interview the chair asks each student a set of questions related to their opinions of their undergraduate experience.
One of the questions that the chair asks concerns their assessment of their understanding of the subject matter of the four core areas of aerospace engineering: aerodynamics, structures, orbital mechanics, and flight dynamics.

Findings
For the 2012-2013 academic year the chair summarized the student responses to this question as follows. "Most of the students indicated that they were most interested in either aerodynamics or orbital mechanics and that they thought that their understanding of the subject matter in those areas was very good. Most students liked basic structures and indicated a good knowledge of that subject area. While some students did not “like” the advanced structures (finite element methods) material, all considered an understanding of that material to be a necessary part of their education as aerospace engineers. Some were contemplating future work in the flight structures area. Regarding flight dynamics, many students indicated that they liked the lab portion of the one course in that subject area. All considered the analysis of the stability and control of airplanes important. Almost all students indicated that the application of information from the four core areas in the airplane design courses increased their understanding significantly".

How did you use the findings for improvement?
The student responses indicate that the material in these four core areas are being presented in a manner that inspires confidence in their ability to tackle problems related to aerodynamics, orbital mechanics, structures and flight dynamics. The basic courses related to their four areas are taught during the junior year in the curriculum and it is very
encouraging that the senior students felt that their background in these areas prepared them very well to handle the material in the senior design capstone sequence AERO 4710 and AERO 4720 courses. The department conducts a complete curriculum review on a five year cycle. The review has been initiated during the spring of 2014 and will continue into the spring of 2015. Results from the senior exit interviews are used extensively during this review process as the faculty meet to discuss each AERO course in the curriculum and seek course improvements.

Additional Comments