

Cover Sheet
Assessment Grants
Application Form for 2008-2009
Submission Deadline: May 1, 2008

The name of the project: _Engineering Student Retention as a Function of Prerequisite Exams Achievement _

Total dollar amount requested from Assessment Grant funds: \$2000 _____

If the department intends to provide matching funds, please include the total dollar amount of matching funds.

Otherwise leave this blank: COE may provide travel funds to a 2009 ASEE conference (\$1400-\$1600?)

Primary contact:

Name: _David B. Lanning Jr. _____

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Phone: _928-777-3930 _____

The goal(s) of the project: The primary goal of the project is to attempt to link performance on prerequisite skills exams, currently being administered in several sophomore-level engineering courses, to student retention at the Prescott campus of Embry-Riddle Aeronautical University. A secondary goal, which should easily follow as a consequence of the primary goal, is to link performance on the prerequisite skills exams to additional academic achievement measures that might enable faculty to use these exams as a predictor of student success or the need for advisor/instructor intervention.

Project abstract:

The goal of the project is to attempt to link performance on prerequisite skills exams to student retention at the Prescott campus of Embry-Riddle Aeronautical University. The prerequisite skills exams, currently administered in three engineering courses in the Aerospace Engineering (AE) degree program (ES 202, ES 204, and AE 304) fall under the category of mastery exams. A student may retake the exam multiple times, encouraging the student to continue efforts toward passing the exam. However, some students take the exams many times, and some never pass the exam. These students often appear to be at-risk students for dropping out of the AE program during their sophomore year, and perhaps at-risk for leaving Embry-Riddle. Dr. David Lanning has maintained detailed records of student achievement in the ES 202 Solid Mechanics prerequisite skills exams. He will use these records, in combination with student drop-out and exit survey records provided by the College of Engineering Academic Advisor, in an attempt to find correlation between student achievement on these exams and student retention at Embry-Riddle.

Submit proposal as an email attachment to Tiffany.Phagan@erau.edu by midnight EST, May 1, 2008, with Assessment Grant Proposal as the subject of the email.

2. Objective of the project: The project attempts to find a correlation between prerequisite skills exams performance and student retention at Embry-Riddle. Several proposed metrics will be developed from detailed records maintained on the ES 202 exams, and these will be matched with student retention data and exit survey results. Additional prerequisite skills exams records from the other two courses (ES 204 and AE 304) will likely be gathered from the faculty teaching those courses and also used in this project. Indicators will be sought out, which may aid AE faculty and other University departments in identifying students who are at-risk for leaving the AE program and Embry-Riddle. These metrics will then be used and improved upon throughout the 2008-2009 academic year at the prerequisite skills exams continue. Results of the study, with student names deleted when appropriate, will be presented to the AE faculty as well as other interested University officials.

3. Participants:

Dr. David B. Lanning Jr.
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4. Description of project:

Prerequisite skills exam (PSE)

The Solid Mechanics prerequisite skills exam falls under the category of mastery exams where a student may retake the exam multiple times, encouraging the student to continue efforts toward passing the exam. A portion of the ES 202 Solid mechanics course grade depends upon successful completion of the PSE. The PSE consists of questions based upon required prerequisite knowledge essential for passing Solid Mechanics. *At-risk students and the "Gauntlet"* A number of the aerospace engineering faculty, including Dr. Lanning, have made the observation that a large number of students find the sophomore year to be a demanding and critical year for continued success. Embry- Riddle students often refer to the group of courses that are scheduled during the second semester of the sophomore year as the Gauntlet." These courses include Solid Mechanics (ES 202), Fluid mechanics (ES 206), Dynamics (ES 204), and Differential Equations (MA 345), and they are often all taken together. A significant number of students struggle at this point in the degree program, and many in this group make the choice to leave the program and Embry-Riddle. This group may be more influenced by issues of academic difficulty than the group of freshman students that leave for perhaps a somewhat different set of personal and academic issues. It is this sophomore group of students taking the Gauntlet, who may be at-risk to leave Embry-Riddle, on which this project is focused.

Prerequisite skills exam

The records that Dr. Lanning keeps of student performance on the PSE contain much information. Some aspects of performance that may be used to help identify at-risk students are:

- a) Pass versus fail (display of academic potential)
- b) Number of attempts taking the exam (display of commitment to education)
- c) Student absent rate during exam (display of commitment to education)
- d) Identifying which students seek (or do not seek) help from instructor (display of commitment to education)

The latter items may be of particular interest, which may aid identifying students that are struggling, and more importantly, appear to be in the process of "giving up" on either completing their engineering program or remaining enrolled at Embry-Riddle. The personal interaction time with students having difficulty passing this exam is significant and useful, and some elements of this may be beneficial in furthering the goals of the study.

Matching PSE performance to student retention

Dr. Lanning will work with the College of Engineering Academic Advisor to obtain both records on AE degree program changes in major and records for students withdrawing from the University. These records will be for those students that have taken the ES 202 PSE within the last two academic years. The PSE was created during the Autumn 2006 semester and first implemented during the Spring 2007 semester. All possible methods for matching PSE performance to aspects of student retention will be investigated. This effort will be continued during the 2008-2009 academic year, gaining additional results from the continuing ES 202 PSEs (as well as other PSE records that faculty teaching ES 204 and AE 304 might be willing to supply to Dr. Lanning). Additionally, Dr. Lanning will investigate success on the PSE as an indicator of continued success in the AE program in terms of subsequent grades in important follow-on courses and overall cumulative GPA.

Disseminating results

Dr. Lanning will make regular reports to the COE faculty as well as other interested ERAU officials. Dr. Lanning also hopes to present results as part of a larger effort on the use of the PSE and concept inventory exams at either the 2009 ASEE (American Society for Engineering Education) Annual Conference or the ASEE Regional Pacific Southwest Conference, as long as the results of the project are meaningful. A trip request will be submitted to the COE Associate Dean for consideration, which might be

considered matching funds by the department. Dr. Lanning recently presented his previous work on the PSE exam [1].

5. Timeline:

- The criteria for at-risk students as matched with PSE performance will be developed, data from necessary student retention records will be mined, and the initial study will be performed during July and August 2008.
- The PSE exam will again be offered during the Autumn 2008 semester, and after completion (late September 2008), Dr. Lanning will add the new data set to the study. Initial findings will be reported to the COE faculty.
- The PSE exam will again be offered during the Spring 2009 semester, and after completion (late January 2009), Dr. Lanning will add this last data set to the study. Findings will be reported to the COE faculty, and Dr. Lanning may attend an ASEE conference to present some of the results.
- Final student retention data after the 2008-2009 academic year will be gathered in May 2009, and the study will be completed. Results will be made available to all interested ERAU officials.

6. Assessment plan:

The project will lead to an assessment on whether or not a meaningful link between PSE performance and student retention may be found. Dr. Lanning will perform the assessment as both a qualitative and quantitative study. The results will be presented to an Embry-Riddle audience, and possibly an external audience (ASEE), and a discussion will commence on whether or not the results show a strong correlation between PSE performance to student retention. If there is a correlation, then a discussion can proceed on whether or not a mechanism should be developed to lead to a positive intervention for at-risk students, and what that mechanism may be.