

# Astronomy Program Assessment Report

## Part I-Assessment SUMMARY (2003-2004)

### A. Program/Discipline Mission Statement

The mission of the Astronomy department is to support ACC goal of being a world class learning centered institution, facilitate student learning and meet the needs of ACC students. The purpose of the Department of Astronomy is to provide educational services in the areas of astronomy for the residents of Arapahoe and Douglas counties and surrounding areas. The department takes a learner centered approach. The courses support transfer requirements for science and non-science students. The department is committed to quality education in the area of astronomy, incorporating the most current astronomy technology and educational methods.

### B. Intended Outcomes

After taking any astronomy course at ACC, the student will:

1. Demonstrate mastery of the specific course competencies and topics that appear on the competency based master syllabus for each course (from the Colorado Community College Course Numbering System).
2. Be able to analyze data and suggest answers or solutions to scientific problems.
3. Use appropriate technology and lab equipment such as calculators and/or computers.
4. Apply the logic, thinking and application of the scientific method to topics in astronomy and be able to apply these principles to “real life” problems.
5. Demonstrate the ability to read, comprehend and write about science related materials

### B. Benchmarks

The benchmark is that the marginal improvement from the pre to the post test will increase by 10 percent for a sampling of at least 50% of the students enrolled in Astronomy 101 classes at ACC. This represents about 70 students of the 140 or so enrolled in Spring 2005. The scores on the Kepler’s Law Lab will increase by 5 percent from the previous semester for the same sample size.

### D. Assessment Results

#### 1. Historical Context

The Kepler’s Law Lab was developed by the Astronomy Department to address the needs of this assessment process. Its implementation in previous semesters has actually resulted in measurable improvement in the knowledge and understanding of that topic by astronomy students at ACC. This is evidence that the assessment

process does measure an increase in the comprehension of these concepts by our students as well a stimulate improvement in our teaching of them.

## 2. Current Year Data Results

Test	Number of samples	Average score	Possible max score	Average as a percent
A.A. test*	191	15.6	30	52%
Kepler's Law	75	22.92	24	95.5%

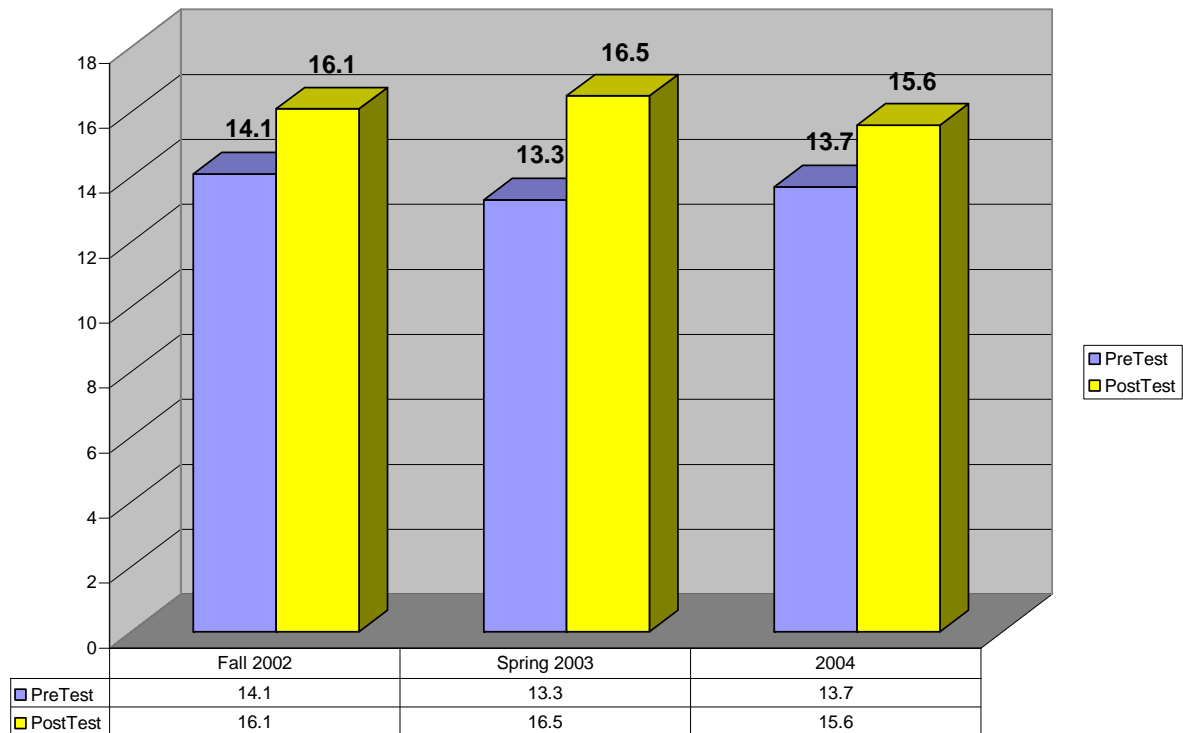
\*ACC Astronomy Assessment Test

## 3. Analysis

### Astronomy Assessment Test

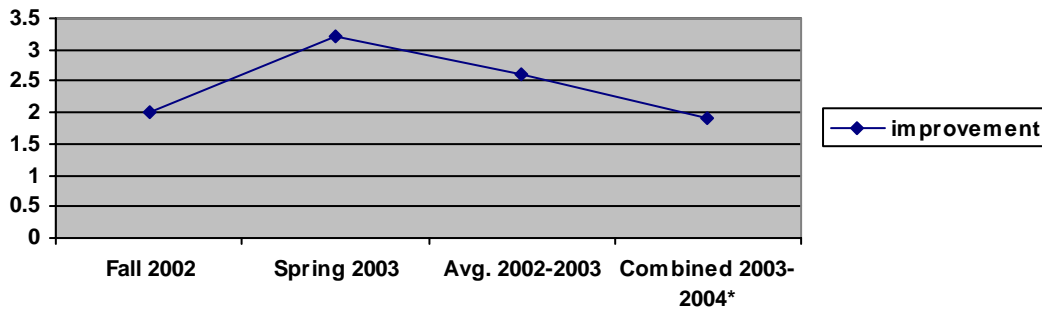
Date	9/02 pre	12/02 post	1/03 pre	4/03 post	2004 pre*	12/04 and 5/04 post
Avg. Score	14.1	16.1	13.3	16.5	13.7	15.6

Astronomy Assessment Test Results



Semester	Fall 2002	Spring 2003	Avg. 2002-2003	Combined 2003-2004*
improvement	2.0	3.2	2.6	1.9

\*For 2003-2004 we are using a benchmark average score of pre-tests of 13.7 which is the average of the two semesters listed.



The improvement last year was 2.6 points. This year it was only 1.9 so the astronomy department failed to achieve the benchmark of 2.6 plus .26 or 2.86. It is difficult to tell whether this represents a real effect or is mere statistical noise. In addition, our processes are still undergoing revision. Next year we will have a consistent measure of the Kepler's Law Lab by having only one person do the grading. A few years of experience will allow us to infer more from these data.

### Kepler's Law Lab

The spring 2003 average score on the Kepler's Law Lab was 17.5. The average score went up to 22.92 which is far better than the benchmark of 17.68 (a ten percent improvement). The astronomy department would be proud to claim such a result, however there may be flaws with the argument. There is a problem with the Kepler's Law scores in Spring 2004. The average score does not represent a fair assessment of the actual understanding of the students. It is too high. The score was affected by the inconsistent grading of at least one adjunct faculty member despite our expending some effort on adjunct training in the use of the Rubric. To reduce this problem one person will do all grading (at least for the assessment purposes) this year.

While the astronomy department recognizes the flaw in these data, we also have a strong intuition as well as some objective evidence that the use of the Kepler's Law Lab does increase student learning in this area. A one or two point bias on the part of a couple of the faculty would not, by itself, produce a jump like this. So it is probably safe to say that though we have not accurately measured it this year, this number does represent an increase in the understanding of the students on this topic. Next year we will be able to more accurately interpret the results of the assessment.

### **E. Use of Results**

We have found that the simple act of assessing automatically improves student learning in the specific areas targeted. This works because when we begin to assess student outcomes, instructors implicitly begin to think about those outcomes and emphasize teaching the necessary material. Our students this year have a deeper understanding of Kepler's laws. Next year they will have a deeper understanding of The Scientific Method. This phenomenon is a built-in result of the assessment process which keeps a program on track, addressing its own stated learning outcomes. We have two new Labs which were written or rewritten especially to address the needs of assessment. All faculty are now using these labs and the entire program is more coordinated and coherent as a result.

These results will be shared with faculty, department chair, dean and the community as a whole. Awareness of the assessment results by faculty will continue to impel the Astronomy Program toward a more focused pedagogy and clear course standards.

### **Part II – Assessment PLAN (2004-2005)**

#### **A. Intended Outcomes : same as above**

#### **B. Identify Assessment Procedures/Methods**

For 2004/2005 these specific learning outcomes will be assessed by administering The ACC Astronomy Assessment Test and assigning a Kepler's Laws Lab as well as the new Scientific Method Lab for all ACC Astronomy 101 students. This will satisfy the requirement to assess all outcomes at least two ways.

Learning Outcome	ACC Astronomy Assessment Test question numbers	Kepler's Law Lab question numbers	Scientific Method Lab question numbers
1	1 through 30	1, 2, 3.e,f	A. B. C. D.
2	18,19,21,22,26,27	3.a,b,c,d	
3		3.a,b,c,d	D. (part 1)
4	1,4,28		B. C. D (part 2)
5	1 through 30	4,5	A. B. C. D (part 2)

#### **C. Benchmarks**

The benchmark is that the marginal improvement from the pre to the post test will increase by 10 percent for a sampling of at least 50% of the students enrolled in Astronomy 101 classes at ACC. This represents about 70 students of the 140 or so enrolled in Spring 2005. The scores on the Kepler's Law Lab will increase by 10 percent from the previous year for the same sample size. The scores on the Scientific Method Lab will increase by a factor of 5 percent from the previous semester for the same sample size.