

Assessment for Astronomy 101

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March 2008
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The Department of Physics and Astronomy has set the following goals for Astronomy 101.

Goals:

1. Students will develop an understanding of the process of scientific inquiry.
2. Students will be able to apply simple quantitative analysis to scientific problems.
3. Students will be able to apply scientific thinking to real world problems.
4. Students will increase their understanding of and enthusiasm for astronomy.

The success in meeting these goals will be assessed by the following outcomes. The outcomes were chosen to cover some of the most important topics and to demonstrate a range of skills that can be measured, not necessarily to cover all the topics in the course.

Outcomes:

Outcome 1 – Models and Scientific Inquiry: Students will be aware of models and theories, for example, heliocentric and geocentric models of the universe and the Big Bang theory. Students will be able to recognize how the scientific process was involved in the development and acceptance or rejection of such models and theories.

Relates to NM HED Area III-1: Describe the process of scientific inquiry.

Outcome 2: Knowledge of Basic Laws of Physics Related to Astronomy and Use of Units: Students will be able use basic laws of physics related to astronomy to estimate answers to various problems. Students will be able to recognize metric units and the correct units in which to measure various astronomical properties.

NM HED Area III competency 2 and 4: Solve problems scientifically. Apply quantitative analysis to scientific problems including showing familiarity with the metric system

Outcome 3: Basic Astronomical Phenomena: Students will understand basic everyday concepts like seasons, the rising and the setting of the Moon and its appearance, and our place in the universe. Students will recognize valid explanations of these phenomena.

NM HED Area III competency 3. Communication of scientific information.

Outcome 4: Environmental Issues Related to Astronomy: Students will understand environmental issues that arise in the context of astronomy, namely greenhouse gases, the ozone layer and light pollution.

NM HED Area II competency 2, 3 and 5. Solve problems scientifically. Communicate scientific information. Apply scientific thinking to real world problems.

Outcome 5: Origin and Nature of the Universe: Students will understand the origin and nature of the universe – subjects with relevance to contemporary societal issues.

NM HED Area II competency 3 and 5. Communicate scientific information. Apply scientific thinking to real world problems.

Assessment Data Collection:

The material covered by these outcomes will be covered in lectures and in the textbook. Students taking the lab will also cover some of the material in lab.

A set of questions that assess these outcomes have been developed. These questions (or similar questions) will be given as part of, or in conjunction with, the exams in Astronomy 101. In order to maintain the validity of these questions across multiple sections and semesters, these questions will not be given out to the students or returned with exams.

Rubric:

For each SLO, there should typically be three multiple choice questions covering the broad concept.

The SLO can be assessed with either of two methods. Method 1 assesses students' performance based on the percentage of questions they answered correctly in each rubric as a group. The instructor can then examine the percentage of students demonstrating Exemplary, Satisfactory, or Unsatisfactory performance on each SLO. Method 2 is more simply based on the average score of all students on all questions in each rubric. The instructor can use this average score to decide if the class performance as a whole is Exemplary, Satisfactory, or Unsatisfactory. The table below provides more detail on what is meant by Exemplary, Satisfactory, or Unsatisfactory performance on each SLO.

Astronomy 101 Rubric for Grading Outcomes Assessment

Outcome	Assessment Questions	Exemplary	Satisfactory	Unsatisfactory
Models and Scientific Inquiry	3 multiple choice questions	3 questions correct or an average score of >75%	2 questions correct or an average score of 60-75%	0-1 questions correct or an average score of <50%
Knowledge of Basic Laws of Physics Related to Astronomy and Use of Units:	3 multiple choice questions	3 questions correct or an average score of >75%	2 question correct or an average score of 60-75%	0-1 questions correct or an average score of <50%
Basic Astronomical Phenomena	3 multiple choice questions	3 questions correct or an average score of >75%	2 question correct or an average score of 60-75%	0-1 questions correct or an average score of <50%
Environmental Issues Related to Astronomy	3 multiple choice questions	3 questions correct or an average score of >75%	2 question correct or an average score of 60-75%	0-1 questions correct or an average score of <50%
Origin and Nature of the Universe	3 multiple choice questions	3 questions correct or an average score of >75%	2 question correct or an average score of 60-75%	0-1 questions correct or an average score of <50%