**Executive Summary**

Over 77% of astronomy students were able to demonstrate their ability to meet the ILOs. This is significant. There are major changes being made to both the astronomy lecture course (Astronomy 160) and the astronomy lab course (Astronomy 151). The lecture course is becoming more engaging with the student, in terms of displaying their understandings of important physical concepts in the curriculum. While the foundation of the course is centered on physical law and our knowledge of the Universe, the course has an ancillary point to be made: how to humans know what we know about the Universe. How is it that physical laws may be used to explain so much?

The laboratory course has become a hands-on experience for the student, where knowing the night-sky and being able to find objects is as important as being able to correctly use lab equipment. The planetarium and the observatory are becoming important tools in demonstrating various aspects of the physical universe in both the lecture course and the laboratory course.

The action plan is to continue to make changes to best meet the growing need for a scientifically literate society. The laboratory course continues to implement new technologies for observation and measurement. The lecture course continues to evolve to challenge students to think and be active in their course and to understand and apply physical concepts. As we continue to assess we will make necessary changes to continue to improve science education in these courses.

**Faculty Included in the Preparation and Sharing of this Report:**

Kenneth Meidl

**Please provide a brief and cogent narrative in response to each of the following questions.**

1. Provide a quantitative analysis for each ILO your CLOs inform. Provide the total number of students who passed/total number of students assessed in each ILO column *and* the corresponding ILO passing rate as an aggregated percentage.

**INSTITUTIONAL LEARNING OUTCOMES Students Passed/Assessed TOTAL RATE**

Communication

1. *Articulate ideas through written, spoken, and visual forms appropriately 157/204 77%*

*and effectively in relation to a given audience and social context.*

1. *Utilize interpersonal and group communication skills, especially those that N/A N/A*

*promote collaborative problem-solving, mutual understanding, and teamwork.*

1. *Mindfully and respectfully listen to, engage with and formally respond to the N/A N/A*

*ideas of others in meaningful ways.*

1. *Plan, design, and produce creative forms of expression through music, speech, N/A N/A*

*and the visual and performing arts.*

Creative, Critical and Analytical Thinking

1. *Analyze differences and make connections among intellectual ideas, academic N/A N/A*

*bodies of knowledge and disciplinary fields of study.*

1. *Develop and expand upon innovative ideas by analyzing current evidence and N/A N/A*

*praxis, employing historical and cultural knowledge, engaging in theoretical*

*inquiry, and utilizing methods of rational inference.*

1. *Utilize the scientific method and solve problems using qualitative and 45/52 87%*

*quantitative data.*

1. *Demonstrate the ability to make well-considered aesthetic judgments. N/A N/A*

Cultural Literacy and Social Responsibility

1. *Interpret and analyze ideas of value and meaning exhibited in literature, N/A N/A*

*religious practices, philosophical perspectives, art, architecture, music, language,*

*performance and other cultural forms.*

1. *Describe the historical and cultural complexities of the human condition in its N/A N/A*

*global context, including the emergence and perpetuation of inequalities and the*

*interplay of social, political, economic and physical geographies.*

1. *Analyze and evaluate the value of diversity, especially by collaborating with N/A N/A*

*people of different physical abilities and those with distinct linguistic, cultural,*

*religious, lifestyle, national, and political backgrounds.*

1. *Demonstrate a pragmatics of ethical principles, effective citizenship, and social 45/52 87%*

*responsibility through cross-cultural interactions, volunteerism, and civic*

*engagement.*

Information and Technology Literacy

*1. Effectively access information and critically evaluate sources of information. 45/52 87%*

*2. Analyze, synthesize and apply information practically and ethically within 157/204 77%*

*personal, professional and academic contexts.*

*3. Identify, utilize and evaluate the value of a variety of technologies relevant to 21/26 81%*

*academic and workplace settings.*

Personal and Professional Development

*1. Identify and assess individual values, knowledge, skills, and abilities in order to set N/A N/A*

*and achieve lifelong personal, educational, and professional goals.*

*2. Practice decision-making that builds self-awareness, fosters self-reliance, and N/A N/A*

*nourishes physical, mental, and social health.*

*3. Apply skills of cooperation, collaboration, negotiation, and group decision-making. 45/52 87%*

*4. Exhibit quality judgment, dependability, and accountability while maintaining N/A N/A*

*flexibility in an ever-changing world.*

1. Reflect on, consider and analyze the data you have. ***What does your CLO data tell you about how your students are achieving ILOs?*** *Be detailed, descriptive and analytical* in this qualitative assessment of each ILO in relation to your CLO data. **Are your results satisfactory?**

In some cases it is difficult to match an ILO with a precisely written CLO. However, if the spirit of the ILO is understood particular CLOs can be matched and assessed with ILOs. In general, the astronomy students have done well in the ILO assessments. Analyzing and synthesizing physical concepts remains to lowest score on these assessments, and that is to be expected, as these are more difficult and higher order learning objectives. The score is a 77% success rate.

Utilizing technology and applying skills of cooperation are nicely tuned with laboratory work. The success rates here increase to 87%.

The results are satisfactory overall.

1. Your department and the college should be making improvements based on student learning outcomes assessment, and we need to continue to document and share the improvements and progress you have already made. Did you make any changes in your CLO statements or analysis during the last 4-year cycle? Did you receive funding for resources requests that were aimed to improve assessment results? Did you make any improvements in the areas of teaching and instruction processes, your courses, or your program? *Please explain your accomplishments and provide details about your efforts.*

The CLOs for astronomy have not changed in the four year cycle, and are well suited to address the learning of a student taking an astronomy survey course. The method of analysis has not changed. Significant changes have been made to the delivery of instruction. Power Point presentations were the norm 5 years ago. Since then new textbooks, on-line reading and homework assignments, and projects have all been implemented at one time. The latest textbook is broken into small units, in lieu of longer chapters. This has proven to be effective in the short term, as quiz scores have improved; quiz scores are not reflected in the CLO assessment directly, however.

The astronomy lab course was previously a paper-lab experience for the student. With the planetarium and student telescopes the current experience is a much more “hand-on” environment. This has helped retain students and helped demand for Astronomy 151, where it was taught occasionally before, but not it is routinely offered.

No funding was requested to make any changes.

1. **Action Plan.** Based on the assessments and analysis you have provided, please consider what changes or improvements you would like to make, which might include updating your CLO statements, modifying course outlines, rethinking instruction efforts, using different assessment instruments, asking for additional resources to improve assessment results, etc. ***Based on the analysis, provide an action plan for improvement that draws on your assessment results and efforts.***

The action plan is to tighten up the delivery of instruction to the student. A new textbook customized for our students is now in use. The text primarily focuses on physical concepts, but secondarily has a focus on how humans go about questioning and learning about the Universe. The scientific method and scientific literacy and a common thread throughout the text, and the revamped lecture portion of the course necessarily reflects this. The nicely matches one of the ILOs.

The laboratory course, Astronomy 151, is now utilizing celestial spheres, binoculars, two types of telescopes, spectrometers, computer simulations, and a state-of-the-art planetarium and observatory to more fully engage the astronomy student at MJC. Direct observations of the night sky, deep sky objects, and the Sun are part of the curriculum.