DATE: October 28, 2015
APPLICANT: Mike Ferguson
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COURSE ALPHA and NUMBER: Astro 110L
COURSE TITLE: Survey of Astronomy Laboratory
ESTIMATED NUMBER OF SECTIONS:
   Fall: 1   Spring: 1

APPLICATION IS FOR:
☒ New Course   ☐ Existing Course
☐ Certification
☐ Re-designation. Date of previous certification or renewal:
☐ Renewal. Date of certification or previous renewal:

DIVERSIFICATION AREA DESIGNATION(S) SOUGHT:
☐ DA (Arts)        ☐ DP (Physical Sciences)
☐ DB (Biological Sciences) ☐ DS (Social Sciences)
☐ DH (Humanities)    ☒ DY (Laboratory)
☐ DL (Literature and Language)

List other general education designations the course is approved for or designations you have applied for (Ethics, HAP, Speech, WI):

COURSE CONTENT AND CLASS MEETINGS REQUIREMENTS:
What percentage of the CONTENT of this course focuses on this diversification area? 80%
What percentage of CLASS MEETINGS focuses on this diversification area? 80%

Note: Applications must include documentation that at least two-thirds of the course content and class meetings focus on the diversification area(s). For new courses, documentation should be a Curriculum Action Proposal with the completed Course Outline form. For existing courses, documentation should be a course syllabus with a course calendar or outline showing topics covered and the number of class meetings dedicated to topics.
Complete the following for Certification and Renewal applications

1. **Hallmarks and SLOs.** Explain how course-specific SLOs align with each of the diversification area’s hallmarks. Use the following format. For each hallmark: (a) re-state the hallmark; (b) list which SLO(s) in the Course Outline form or syllabus align with the hallmark; and (c) provide a brief narrative explaining how the SLO(s) align with the hallmark.

<table>
<thead>
<tr>
<th>SLO’s:</th>
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<tr>
<td>1. Apply the scientific method to a selected group of topics in astronomy.</td>
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<tr>
<td>2. Collect, report and analyze data obtained in a laboratory and/or observatory setting in a manner exhibiting organization, proper documentation and critical thinking.</td>
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<tr>
<td>3. Demonstrate a basic understanding of the use of standard astronomical instruments.</td>
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<tr>
<td>4. Perform image analysis, especially as related to astronomical photographic data.</td>
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<tr>
<td>5. Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.</td>
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<tr>
<td>6. Demonstrate a working knowledge of computer on-line and Internet astronomical programs.</td>
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**Hallmarks DY:**

DY.1 uses the laboratory methods of the biological or physical sciences;

SLO 2 and SLO 3 directly deal with the instruments that astronomers use, mainly telescopes, and use them to collect data. SLO 5 deals with how to adapt the measurement to ambient conditions. This is common in astronomy as well.

DY.2 involves processes and issues of design, testing, and measurement;

SLO 1 is about the application of the scientific method which works for all natural sciences and experimentation is a step in the scientific method dealing with this hallmark. Already mentioned in DY.1 are the methods in astronomy, but SLO 4 and SLO 6 deal with the processes and analysis following the measurements, which follows in the processes in DY.2. It is more than just a practicum because the students will be required to know the inner workings of the telescopes and use the telescopes to look at astronomical events and compare those events to physics concepts. There are portions of the lab outside of the telescopes involving optics of light and atomic spectra. These concepts are intertwined with the use of the telescopes so that students may more accurately understand the significance of the images they see.

DY.3 demonstrates the strengths and limitations of the scientific method.

SLO 2 and SLO 3 directly deal with instrumentation and collection of data for astronomers. There are always issues with error in measurement and that is an issue that all scientific inquiry faces. Also, since astronomy is an developing field, there will be many discoveries that will be topics of discussion, so the evolving nature of a field will be apparent within the class.
2. **Assessment tools and strategies.** Describe the assessment tools (e.g., surveys, embedded questions in an exam, performances) and strategies (e.g., when, how often) for measuring the degree to which students achieve course-specific SLOs. Specific information needed: (a) description of assessment tools and explanation of which tool will be or was used to assess each SLO; (b) explanation of how often assessment will be or was conducted; and (c) if there are multiple sections of the course, discussion of how assessment will be or was carried out across sections and instructors.

**SLO’s:**

1. Apply the scientific method to a selected group of topics in astronomy.
2. Collect, report and analyze data obtained in a laboratory and/or observatory setting in a manner exhibiting organization, proper documentation and critical thinking.
3. Demonstrate a basic understanding of the use of standard astronomical instruments.
4. Perform image analysis, especially as related to astronomical photographic data.
5. Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.
6. Demonstrate a working knowledge of computer on-line and Internet astronomical programs.

SLO 1 will be evaluated using summative methods in the laboratory reports mostly in the terms of essay questions in the lab report. Laboratory quizzes will be used to test this SLO in a summative fashion. This SLO will vary term to term because of the nature of astronomical events happening like lunar eclipses and time of the year when different stars are viewable. There will be plenty of consistency with terms because many of the topics will remain the same like optics and the physical nature of light as it pertains to the telescopes and atomic spectra that show the application of quantum theory to astronomy.

SLO 2 and SLO 3 will be evaluated formatively while the lab is in process. SLO 2 may also be evaluated in a summative fashion in the lab report. SLO 3 will also be evaluated in a summative fashion in laboratory quizzes because the SLO ties into optics and other physics concepts. The students will have to show skills in collection and analysis of data and demonstrate an understanding of instruments as stated in the SLOs.

SLO 4 will be evaluated via summative questions in a lab report. These assessments will be able to show that the students can perform the analysis and perform simple calculations and extrapolations from the data they collect.

SLO 5 will be evaluated via formative assessment as the laboratory is in progress because environmental factors like clouds and light pollution from anthropogenic sources or the moon will ever be present in the lab.

SLO 6 will be evaluated via formative assessment as the lab is in progress. The instructor will be present to assess the students as they are working on the computers. The instructor will be able through interaction with the students be able to verify that the student has mastered this learning outcome.

Assessments will be conducted every laboratory session where data are collected or analyzed. There will be a few sessions like the first laboratory session where assessment will not take place. There will only be one instructor and only one or two sections of this class, so there is no need to check for continuity across instructors.
DIVERSIFICATION BOARD DECISION:

X  Approved

Renewal Due: Fall 2020

☐  Not approved

Reasons:


Diversification Board Chair Signature:

Date: Fall 2015
Diversification Application Evaluation Checklist

Cover Page
- Applicant and course information completed
- New courses. Copy of the Curriculum Action Proposal for new courses and a Course Outline form
- Existing Courses (Renewals or Existing Courses seeking certification). Copy of course syllabus with:
  - Course description
  - Articulation statement
  - Course-specific SLOs
  - Course calendar showing topics and number of meetings dedicated to each topic

- Course CONTENT meets the 2/3 requirement?
- Course MEETINGS meet the 2/3 requirement?

Applications for Certification and Renewal

Question #1: Hallmarks and SLOs
- Hallmark # D__. 1
  - States hallmark and the SLO(s) that align with the hallmark.
  - Explains how the SLO(s) align with the hallmark.
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  - Explains how the SLO(s) align with the hallmark.

Question #2: Assessment tools and strategy
- Discusses which assessment tools will be (was) used to assess which SLO(s).
- Plan for how often assessment will occur (occurred).
- For courses with multiple sections, includes explanation of assessment across sections and instructors.

Applications for Renewal, Only

Question #3: Assessment
- For each SLO, described aggregated results across instructors and sections.
- Assessment done throughout certification period.

Question #4: Utilization of assessment results
- Narrative covers entire certification period.
- Includes discussion of how results were used to improve or modify the course.
- Discussion occurred among all instructors teaching the course.

Comments:

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