Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Astronomy	111	AST 111 06/05/2023-General Astronomy
College	Division	Department
	Math, Science and Engineering Tech	Physical Sciences
Faculty Preparer		Daniel Majaess
Date of Last Filed Assessment Report		11/30/2021

I. Review previous assessment reports submitted for this course and provide the following information.

1. Was this course previously assessed and if so, when?

Yes

AST 111 was previously assessed in Winter 2021. The introductory astronomy course is part of a suite of Physics department offerings (e.g., ENV, GLG) tailored to enrich the scientific knowledge of students primarily pursuing careers outside astrophysics.

2. Briefly describe the results of previous assessment report(s).

The 2021 assessment implied that the course helped enhance the celestial, lab, and arithmetic knowledge of students. The previous assessment report cited satisfactory average test (85%), lab (89%), and observing (96%) marks; however, countless tweaks and adjustments continue unabated (e.g., improving the succinctness and clarity of posed lab questions). Yet new challenges have emerged since 2021, such as the educational decline exhibited by students owing to the pandemic, and the emergence of readily available AI.

3. Briefly describe the Action Plan/Intended Changes from the previous report(s), when and how changes were implemented.

The action plan broadly outlined in the last report included an emphasis on constantly refining questions posed on tests and labs, namely to sharpen the succinctness of those questions and their possible answers, improve their clarity, and ultimately facilitate comprehension by students. Furthermore, the previous assessment likewise urged that current students may be uplifted by embedding within Blackboard positive developments by WCC alums in NASA's Community College Aerospace Scholar program, and NASA’s L’Space program.

II. Assessment Results per Student Learning Outcome

Outcome 1: Identify principles tied to celestial cycles and the history of astronomy, planets, starlight and stars, galaxies and cosmology.

- Assessment Plan
    - Assessment Tool: Outcome-related test questions
    - Assessment Date: Winter 2023
    - Course section(s)/other population: All
    - Number students to be assessed: All
    - How the assessment will be scored: Departmental tests are scored using an answer key.
    - Standard of success to be used for this assessment: 75% of students will score greater than 70%
    - Who will score and analyze the data: Astronomy faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2023	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
267	246

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessment may exclude data from students who withdrew or did not complete the activity (e.g., absence).

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from online (asynchronous), virtual (synchronous), and face-to-face (F2F) classes.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of tests scored by an answer key (e.g., multiple choice, numerical value).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
The current tests primarily sample the following matching areas, namely i) the history of astronomy, celestial cycles, planets, ii) starlight and stars, iii) galaxies and cosmology. The following test averages are tied to each area: i) 89%, ii) 88%, and iii) 89%. The mean across all test scores is 88%, and the standard of success was achieved (respectively, 237/246 (96%), 232/236 (97%) and 219/253 (87%) students scored >70%).

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The scores may be high owing in part to the textbook being permitted during tests. However, observing students realize that books can be advantageous when thoroughly examined, so it was a worthwhile tradeoff. Although this is an introductory astronomy course aimed at non-science students, each test features a small subset of arithmetic questions tied to the labs, as the view was adopted when creating the course that all students should be proficient in basic math. It was likewise enjoyable to observe students realize that one can exploit simple math to characterize the encompassing cosmos (e.g., the expansive distances and sizes of galaxies). Paradoxically, the assessor believes the aforementioned student realizations may be more pertinent than the memorization of cosmic facts.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

The instructors are always re-examining the succinctness of test questions and answers, a process that continues regularly, and which leads to improved student comprehension. That is carried out in tandem with a recognition that this is an introductory course, with a corresponding level of difficulty nuance-wise, yet while still demanding that students invest considerable time to acquire rich cosmic knowledge. Perhaps additional arithmetic questions may be placed on the tests beyond the relatively small subset presently employed, and again which are tied to knowledge or skills acquired through the labs.

Outcome 2: Perform laboratory experiments, scientific research and apply math principles to data collection and analysis.

- Assessment Plan
    - Assessment Tool: Outcome-related lab reports
    - Assessment Date: Winter 2023
    - Course section(s)/other population: All
    - Number students to be assessed: All
    - How the assessment will be scored: Departmental labs are scored using an answer key.
    - Standard of success to be used for this assessment: 75% of students will score greater than 70%
    - Who will score and analyze the data: Astronomy faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2023	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
267	263

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessment may exclude data from students who withdrew or did not complete the activity (e.g., absence).

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from online (asynchronous), virtual (synchronous), and F2F classes.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of labs which were scored using an answer key (e.g., numerical value).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
The average across the labs is 93%, and the standard of success was achieved (i.e., 95% of students (249/263) scored >70%). The course's MTA (lecture+lab) nature is inherently linked to the labs, and the relatively new in-house tailor-made math-based labs were created to underpin that accreditation (e.g., 'Henrietta Leavitt's Work on the Cosmic Distance Scale', the generally unknown woman who discovered how to measure the Universe).

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The labs are accomplishing their task of reinforcing the course's MTA (lecture+lab) designation. They aid in enhancing a student's measuring skills, scientific awareness, and arithmetic proficiency. Indeed, insight gained from the labs permeates through nearly every aspect of the course. A small subset of arithmetic questions tied to the labs are included in the tests and extra practice questions, an observing component that can be categorized as laboratory exercises, and students participate in citizen science projects (e.g., helping NASA find planets beyond the Solar System) via a discussion board assignment.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Continued improvement will include streamlining lab questions and the course's Blackboard site, and highlighting role models (WCC alum) who benefitted from lab (arithmetic) experience. Former WCC students certainly inspire the present cohort. Embedding that inspiration in the course via the labs, announcements, quizzes, etc., helps foster student interest in the course, and as a result may improve comprehension. Lastly, time pending, in the future the assessor is considering creating a qualitative based lab on the classification of meteorites and tektites, with input from GLG faculty.

Outcome 3: Perform observations of the cosmos.

- Assessment Plan
    - Assessment Tool: Observing project
    - Assessment Date: Winter 2023
    - Course section(s)/other population: All
    - Number students to be assessed: All
    - How the assessment will be scored: The departmental observing project is scored pass/fail using a simple set of instructions/rubric
    - Standard of success to be used for this assessment: 75% of students will score a pass
    - Who will score and analyze the data: Astronomy faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2023	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
267	192

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessment may exclude data from students who withdrew or did not complete the activity (e.g., absence).

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from online (asynchronous), virtual (synchronous), and F2F classes.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of discussion board posts where students conveyed the cosmic observations they carried out, and was scored in a generally straightforward fashion (complete/incomplete). A passing score is 2.5/5.

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
The average score for the observing task was 88%, and the standard of success was achieved (i.e. 91% of students (175/192) scored a pass). Furthermore, in the broader context of astronomy courses, observing can be considered as laboratory exercises, thereby again underpinning the MTA (lecture+lab) nature of the course. The observing component is among the aspects of the course that instructors find most enjoyable, and are themselves often inspired to observe certain celestial targets relayed in student posts.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

This past winter and fall students were blessed to observe Venus and Jupiter, both of which were immensely bright, with the latter being at its brightest the assessor ever witnessed. Indeed, students often remark that for the first time they observed planets with their own eyes, and countless diverse targets such as the large basins on the Moon. A student recently noted, 'I think overall this project has made me realize the potential my eyes have for admiring and searching the night sky. So from now on, I plan to look at the night sky with gratitude and admiration.' Another pleasant memory occurred when an excellent student superseded the assessor and a fellow instructor by carrying out a successful observation of Mercury, which is challenging owing to its proximity to the Sun. Lastly, a narrow-band solar telescope was acquired thanks to the encouragement from GLG faculty (department chair) and the lab manager, which provided a subset of F2F students their first true glance at the Sun's marvelous structures/phenomena. Going forward, all F2F students shall be able to engage in that rare opportunity.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Improvement can be sought by ensuring that WCC instructors communicate to students when clear nights occur, although observing outside is not a requirement of the project (e.g., there exist planetarium software for computers, tablets, and smartphones). Having instructors likewise actively comment on student observing submissions fosters a more energized cohort.

III. Course Summary and Intended Changes Based on Assessment Results

1. Based on the previous report's Intended Change(s) identified in Section I above, please discuss how effective the changes were in improving student learning.

The comparatively marginal changes in certain mean scores could indicate that student success on the tests and labs has increased, however, a complex multivariate analysis would be needed with numerous terms that are too uncertain, or intangible to characterize. What can be firmly concluded is that: the average scores are again satisfactory and reached a certain threshold, the course is enhancing the celestial knowledge of those who take it, and the course is becoming increasingly streamlined over time (in the same way that many introductory textbooks are in their 8th edition). That is owing in part to changes to the course being taught regularly.

2. Describe your overall impression of how this course is meeting the needs of students. Did the assessment process bring to light anything about student achievement of learning outcomes that surprised you?

The assessment process allowed the assessor to further examine the course from a broad perspective. The course is meeting the needs of students, but continued vigilance is required. As noted previously, marked shifts in education are occurring owing to the pandemic and availability of AI.

3. Describe when and how this information, including the action plan, was or will be shared with Departmental Faculty.

The course is regularly discussed with fellow astronomy instructors, students, faculty colleagues, etc. For example, the course was selected to be part of the Alpha Scholars cohort for several terms, whereby techniques for potentially increasing student success were discussed weekly among faculty teaching diverse topics. The course was likewise selected for the Accelerated Business program, and we had many conversations during that time with fellow faculty in PHL and ENV. Indeed, that section of students in the Accelerated Business program remain among the most memorable and admirable, given all they accomplished in such a rapid time. Astronomy may have been among the last courses in the lineup needed to complete the program, and consequently the students were already forged to be rigorous, organized, disciplined, and to therefore invariably succeed.

4. Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Course Materials (e.g. textbooks,	OC#1: Consider including additional	OC#1: To reinforce knowledge/skills	2023

handouts, on-line ancillaries)	arithmetic questions on the tests. OC#2: Consider creating a qualitative based lab related to the classification of meteorites and tektites, with input from GLG faculty. OC #3: Continue to encourage instructors to more actively communicate to students when clear nights occur and actively comment on student observing submissions.	acquired through lab. OC#2: To promote student engagement and comprehension. OC #3: To encourage more participation in observation outside.	
Other: master syllabus update	The course description will be updated (e.g. the new JWST highlighted).	The changes are being made to reflect updates to the course (e.g. NASA's successful comparatively recent launch of JWST, and new results emerging from that effort).	2023

5. Is there anything that you would like to mention that was not already captured?

The assessment process provided an expansive view of the course, and reminded the assessor what is perhaps most important given that the quantitative measurements of the canonical tests and labs were met. That is to again dedicate energy to identifying lucrative and advantageous resume-building opportunities for students' post-completion of the course (e.g., secure the bridges from WCC to NASA programs). Understanding that a star such as the Sun is ubiquitous is intellectually stimulating, but becoming aware of opportunities post-completion of the course at NASA or UMich may be pertinent intellectually and career-wise.

The following vision is in the contemplation stage. Beyond perhaps constructing a new qualitative based lab on meteorites and tektites in consultation with GLG faculty, the assessor aims to embed more of the intersection between astronomy and art (music, literature, poetry, painting, horology) into the course's Blackboard site. For example, the Detroit Institute of Art recently had among the largest exhibits of Vincent van Gogh art, who once remarked, 'I don't know anything with certainty, but the stars make me dream.' One of the paintings at the DIA was the famed Starry Night Over the Rhone, which is estimated to be worth >200 million USD, and its most prominent feature is the big dipper (part of the constellation of Ursa Major, the big bear). There is a famous song by American songwriter and singer Don McLean titled, 'Starry Starry Night', which the assessor has discovered profoundly moves students. On the classical-impressionist music side there is the piano work titled Claire de Lune (moonlight), by Claude Debussy, which also elicits profound emotions from students. There is the case of Abraham Lincoln in the 'Almanac Trial', whereby a relatively recent book argued that the trial tarnishes the former president's reputation. Basic knowledge of astronomy can be leveraged to settle the debate, and free Lincoln from invalid claims that he committed perjury, and willingly presented false evidence at a trial. There are delightful poems and passages by Whitman and Grudin, with the latter noting, 'The future is like the daytime Moon, a diffident but faithful companion, so elegant as to be almost invisible, an inconspicuous marvel.' The assessor has aimed to always convey to students that astronomy isn't merely astrophysics, and it encompasses a broad canvas from van Gogh to Einstein, da Vinci to Shakespeare (note the new star in the opening act of Hamlet ties back to the last Galactic supernova witnessed by humans, during Shakespeare's youth). The assessor aims to perhaps continue incorporating such connections into the Blackboard site, to ensure all WCC astronomy students are exposed to them, and are perhaps inspired. Lastly, efforts to establish bridges from WCC to NASA will continue, and faculty are now participating in NASA’s Community College Network (NCCN).

III. Attached Files

Assessment Data

Faculty/Preparer:	Daniel Majaess	**Date:** 07/24/2023
Department Chair:	Suzanne Albach	**Date:** 07/29/2023
Dean:	Tracy Schwab	**Date:** 08/01/2023
Assessment Committee Chair:	Jessica Hale	**Date:** 01/04/2024

Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Astronomy	111	AST 111 06/04/2021-General Astronomy
College	Division	Department
	Math, Science and Engineering Tech	Physical Sciences
Faculty Preparer		Daniel Majaess
Date of Last Filed Assessment Report		09/12/2019

I. Review previous assessment reports submitted for this course and provide the following information.

1. Was this course previously assessed and if so, when?

Yes The course was previously assessed in 2019.

2. Briefly describe the results of previous assessment report(s).

The 2019 assessment implied that the course positively enhanced the celestial, lab, and arithmetic knowledge of students. In concert with other PHYD WCC offerings, the course enriched student lives, namely by introducing them to the wonders of the cosmos and the rich phenomena therein. Yet, a process of incessant refinement must continue. The prior average lab and test marks were satisfactory for science-based courses featuring math (85% & 75%), but an outcome tied to the tests was not achieved in 2019.

3. Briefly describe the Action Plan/Intended Changes from the previous report(s), when and how changes were implemented.

The suggested changes included the implementation of a new outcome tied to students observing the cosmos with the aid of smartphone apps and slight adjustments to the outcome language. More broadly, there was an emphasis on sharpening the succinctness of test and lab questions/answers, while being mindful that this is an introductory astronomy course and the majority are pursuing careers outside astrophysics. The observing task was tweaked and outcome introduced, and the refinement of test and lab questions is continuous.

II. Assessment Results per Student Learning Outcome

Outcome 1: Identify principles tied to celestial cycles and the history of astronomy, planets, starlight and stars, galaxies and cosmology.

- Assessment Plan
    - Assessment Tool: Departmental tests
    - Assessment Date: Winter 2021
    - Course section(s)/other population: All
    - Number students to be assessed: All
    - How the assessment will be scored: Departmental tests are scored using an answer key.
    - Standard of success to be used for this assessment: 75% of students will score greater than 70%
    - Who will score and analyze the data: Astronomy faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2021	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
269	241

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessed sample excludes students who withdrew or completed few tasks.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from numerous online and virtual classes.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of tests which exhibited an uncomplicated answer key (e.g., multiple choice).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
The current tests sample the following matching areas, namely i) the history of astronomy, celestial cycles, planets, ii) starlight and stars, iii) galaxies and cosmology. The following results are tied to averages: i) 87%, ii) 84%, and iii) 85%. The average across all test scores is 85%, whereby >90% of the class scored above 70%. As a result, the standard of success was achieved.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

In science-based math courses, an average test score near 75% is considered satisfactory, and that criterion was exceeded, thus indicating the strength of student achievement. The potential decline in the average mark as a function of time may indicate fatigue as term neared its end, particularly during this pandemic era.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

The instructors often examine the succinctness of test questions and answers, a process that shall continue unabated and leads to improved comprehension. That is carried out while being cognizant that this is an introductory course, and there is a corresponding level of difficulty.

Outcome 2: Perform laboratory experiments, scientific research and apply math principles to data collection and analysis.

- Assessment Plan
    - Assessment Tool: Labs
    - Assessment Date: Winter 2021
    - Course section(s)/other population: All
    - Number students to be assessed: All
    - How the assessment will be scored: Departmental labs are scored using an answer key.

- Standard of success to be used for this assessment: 75% of students will score greater than 70%
- Who will score and analyze the data: Astronomy faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2021	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
269	241

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessed sample excludes students who withdrew or completed few tasks.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from numerous online and virtual classes.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of labs which exhibit an uncomplicated answer key (e.g., numerical value).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
The average across the labs is 89%, whereby >85% of students achieved a score higher than 70%. Consequently, the standard of success was achieved. The course's MTA nature is linked to the labs, and the relatively new tailor-made math-based labs were created to bolster that accreditation.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The labs are a key component of the course, and the average score relays the strength of the student achievement. The labs are accomplishing their task, namely to enhance a student's lab, scientific research, and arithmetic experience, and to reinforce the course's MTA designation.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

One way to foster continued improvement is to continue streamlining lab questions and the Blackboard interaction, and also to provide examples of role models who benefitted from lab experience. Instructors have found that former WCC students best inspire the present cohort, are most relatable, and thus exemplify to present WCC students that they too can likewise succeed if they extend their arithmetic and lab skills (e.g., Aisha Bowe, Emilee Seghi, etc.). Specifically, there is a need to continue highlighting and embedding that inspiration in labs in a seamless fashion.

Outcome 3: Perform observations of the cosmos.

- Assessment Plan
    - Assessment Tool: Observing project
    - Assessment Date: Winter 2021
    - Course section(s)/other population: All
    - Number students to be assessed: All
    - How the assessment will be scored: The departmental observing project is scored pass/fail using a simple set of instructions.
    - Standard of success to be used for this assessment: 75% of students will score greater than 70%
    - Who will score and analyze the data: Astronomy faculty

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2021	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
269	241

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessed sample excludes students who withdrew or completed few tasks.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from numerous online and virtual classes.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of discussion board posts where students conveyed the cosmic observations they carried out, and was scored in a generally straightforward fashion (complete/incomplete).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
The average score obtained for the observing task was 96%, whereby >85% of the students obtained higher than 70%. The standard of success was therefore achieved. The observing component is among the aspects of the course that instructors find most enjoyable to participate in. For example, it is energizing to read student posts highlighting that they were previously unaware how accessible the cosmos could be.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The strength of the student achievement is relayed by the high average score. Moreover, students often remark that for the first time they observed planets with their own eyes, and countless diverse targets such as the large basins on the Moon.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Improvement can be sought by continuing to hire staff that have observational astronomy experience. WCC instructors are encouraged to communicate to

students when clear nights occur, although observing outside is not a requirement of the project. To foster accessibility students can use smartphone apps which chart the encompassing cosmos in real-time before them.

III. Course Summary and Intended Changes Based on Assessment Results

1. Based on the previous report's Intended Change(s) identified in Section I above, please discuss how effective the changes were in improving student learning.

The introduction of an outcome to assess the observing aspect was needed. Second, on both fronts, the average lab and test mark increased relative to the prior assessment, yet a direct comparison is hindered in part by changes associated with the pandemic. Perhaps most important is the several percent increase in the average lab mark (+4%), which is a core aspect of the course's MTA accreditation. Regardless, refinements shall persist to sharpen test and lab questions, and streamline the blackboard course site.

2. Describe your overall impression of how this course is meeting the needs of students. Did the assessment process bring to light anything about student achievement of learning outcomes that surprised you?

In sum, the high enrollment and retention rate, positive SOQ feedback to instructors regarding the course, and the quality of student posts (e.g., observing) suggest WCC astronomy in tandem with other PHYD WCC course offerings is providing an enriching experience. Moreover, numerous WCC students have been accepted into NASA's Community College Aerospace Scholar program, and WCC students are joining UMich's undergraduate rocketry team (MASA) while still enrolled at the college (a new bridge we're trying to establish). The assessment process has reaffirmed the general positive trend together with the aforementioned, however, work to streamline the blackboard site and assignments shall persist. One should continually pursue improvements and avoid complacency.

3. Describe when and how this information, including the action plan, was or will be shared with Departmental Faculty.

The assessor is in regular contact with numerous WCC colleagues regarding aspects of the course, who kindly act as a soundboard and provide pertinent advice and encouragement. That open discussion continues, and will include the sharing of findings inferred from this report.

4. Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Course Materials (e.g. textbooks, handouts, on-line ancillaries)	The assessment process required a holistic view that included examining prior assessment reports and the master syllabus. The textbook information on the master syllabus requires updating.	A new textbook edition has been released, however, to mitigate student expenses either the 5th or 6th editions can be utilized by students.	2021
Course Materials (e.g. textbooks, handouts, on-line ancillaries)	Continue to streamline lab questions and Blackboard interactions to increase student comprehension.	Continuous improvement.	2021
Other: Course description/objectives language	The assessment process required a holistic view that included examining prior assessment reports and the master syllabus. The language associated with the course description and objectives on the master syllabus can be sharpened.	Phrasing structure can always be improved and streamlined.	2021

5. Is there anything that you would like to mention that was not already captured?

6.

III. Attached Files

data

Faculty/Preparer: Daniel Majaess **Date:** 06/29/2021

Department Chair:	Suzanne Albach	**Date:** 07/19/2021
Dean:	Victor Vega	**Date:** 07/20/2021
Assessment Committee Chair:	Shawn Deron	**Date:** 11/30/2021

Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Astronomy	111	AST 111 06/22/2019-General Astronomy
Division	Department	Faculty Preparer
Math, Science and Engineering Tech	Physical Sciences	Daniel Majaess
Date of Last Filed Assessment Report		

I. Review previous assessment reports submitted for this course and provide the following information.

1. Was this course previously assessed and if so, when?

   No

2. Briefly describe the results of previous assessment report(s).

   3.

4. Briefly describe the Action Plan/Intended Changes from the previous report(s), when and how changes were implemented.

   5.

II. Assessment Results per Student Learning Outcome

Outcome 1: Students will be able to identify concepts and recognize principles of the History of Astronomy, the Night Sky, and Cosmology.

- Assessment Plan
  - Assessment Tool: Departmental Exam
  - Assessment Date: Fall 2008
  - Course section(s)/other population: all
  - Number students to be assessed: all
  - How the assessment will be scored:
  - Standard of success to be used for this assessment:

- Who will score and analyze the data:

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2019	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
164	147

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessed sample excludes students who withdrew or completed few tasks.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from a F2F morning section, a F2F afternoon section, and several DL sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of tests which exhibit an uncomplicated answer key (e.g., multiple choice).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: <u>No</u>
The existing decade-old master syllabus exhibited the following breakdown: i) the history of astronomy, ii) [objects in] the night-sky, and iii) cosmology. The current tests essentially sample among the following matching areas, namely i) the history of astronomy, celestial cycles, planets, ii) starlight and stars, iii) galaxies and cosmology. The results are as follows, and are tied to straight averages: i) 75%, ii) 77%, and iii) 69%. The straight average across all test scores is 75%, whereby 56% of the class scored above 75%. The implied average test mark is consistent with that

expected for a high-standard and robust science astronomy class but does not meet the dated criterion that 75% of the class achieve an average test score of 75%.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The results hint that students achieved higher marks when the topic was linked to stars (second test). At first glance one could potentially hypothesize that this test garnered increased student attention due to its content, which includes the nuclear fusion process powering the Sun and exotic phenomena such as supernovae. However, an equally compelling hypothesis is that the second test scores were higher than the first because the students gained experience, and astronomy is a subject where the knowledge is cumulative. However, the mark for the third test subsequently drops owing to fatigue endemic to term's end.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

The tests require constant refinement, namely to sharpen the succinctness of the questions and their possible answers. Instructors must continue questioning what is most important for a demographic of students taking this course. The majority are pursuing careers outside astrophysics, and beyond enhancing their cosmic, lab, and arithmetic knowledge, the aim is to enrich their lives going forward and draw them toward the wonder of the encompassing Universe(s).

Outcome 2: Students will be able to solve astronomical problems pertaining to the Night Sky, Cosmology, and the History of Astronomy.

- Assessment Plan
    - Assessment Tool: Departmental Exam
    - Assessment Date: Fall 2008
    - Course section(s)/other population: all
    - Number students to be assessed: all
    - How the assessment will be scored:
    - Standard of success to be used for this assessment:
    - Who will score and analyze the data:

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
	2019	

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
164	147

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

The assessed sample excludes students who withdrew or completed few tasks.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

The sample features students from a F2F morning section, a F2F afternoon section, and several DL sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

The outcome was assessed on the basis of labs which exhibit an uncomplicated answer key (e.g., numerical value).

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes
New tailor-made labs were created since the last master syllabus (a decade ago) that aim to bolster the course's MTA accreditation. The course's MTA nature is linked to the labs, and the College expanded the department faculty in part to institute such changes. The emphasis is on enhancing lab, scientific research, and math technique. A key pillar being the comprehension of uncertainties linked to solving astronomical problems, comparing results using uncertainties in science, and interpreting and constructing graphs that exhibit data featuring uncertainties. That broadly matches the outcome cited on the existing decade-old master syllabus, namely "Students will be able to solve astronomical problems ..." The class straight average is 85%, which is high granted students were afforded the ability to achieve a perfect score on the arithmetic-based labs if they committed the time. The standard of success was achieved according to the dated

criterion (i.e., 75% of students obtain an average of 75%), as 80% of the class achieved a score of 75%.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The labs are accomplishing their task, namely to buttress the course's MTA designation and enhance a student's lab, scientific research, and arithmetic experience.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

The new labs implemented are achieving the objectives sought, but require incessant fine-tuning, particularly on the DL platform. Specifically, further embedding of videos and graphics is desirable, and perhaps additional visuals whereby a measurement is inferred by the student, rather than the student being provided results to analyze.

III. Course Summary and Intended Changes Based on Assessment Results

1. Based on the previous report's Intended Change(s) identified in Section I above, please discuss how effective the changes were in improving student learning.

There was no previous report.

2. Describe your overall impression of how this course is meeting the needs of students. Did the assessment process bring to light anything about student achievement of learning outcomes that surprised you?

The course is beneficial and enriching for students, yet a process of incessant refinements continues. A suite of modifications were and will be made to the course, and partly aim at improving its ease of use and bolstering the course's MTA standing. Concerning the latter, beyond newly implemented labs, students now engage in a project to carry out visual (naked eye) observations of the cosmos with the aid of advanced smartphone apps. The assessment helped cement existing ideas concerning the course's improvement and of pedagogy in general.

3. Describe when and how this information, including the action plan, was or will be shared with Departmental Faculty.

The instructor has been fortunate that numerous colleagues at the institution have acted as a sound-board, given counsel drawn from years of experience, and provided encouragement to carry out envisioned modifications. That open discussion continues unabated, including findings shared in this report.

4.

Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Outcome Language	The second outcome shall be adjusted to garner pertinent laboratory, scientific research, and math experience.	The adjustment reflects the importance of bolstering the course's MTA designation, which relies on a viable lab component.	2019
Outcome Language	A new outcome to be implemented is that students shall observe the cosmos.	Visual observations are a pertinent part of astronomy, and the course shall convey to students how they can readily access the cosmos using a smartphone app.	2019
Outcome Language	The first outcome will be adjusted slightly to i) the history of astronomy, celestial cycles, planets, ii) starlight and stars, iii) galaxies and cosmology.	The slight change better matches the present iteration of the course, relative to the existing decade-old master syllabus.	2019

5. Is there anything that you would like to mention that was not already captured?

6.

III. Attached Files

AST 111 Assessment Data

Faculty/Preparer:	Daniel Majaess	**Date:** 07/26/2019
Department Chair:	Suzanne Albach	**Date:** 07/29/2019
Dean:	Kimberly Jones	**Date:** 08/13/2019
Assessment Committee Chair:	Shawn Deron	**Date:** 09/11/2019