

AST2023: Astrophotography: Art & Science

Fall 2025 | 3 credits



NOTE: This course complies with all UF academic policies. For information on those policies and for resources for students, please see UF's "[Academic Policies and Resources](https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/)" – (<https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/>) web page.

I. General Information

Meeting days and times: Wednesday E1-E3 (7:20-10:10 PM)

Class location: MAT0103

Instructors:

Name: Noah Rashkind

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Zoom: <https://ufl.zoom.us/my/ufastrophotography>

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Teaching Assistant(s):

Name: Jared Cathey

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Course Website on Canvas

Catalog Description

Overview of Astrophotography. Basic telescope, camera and image processing techniques. Impact of light pollution and artificial satellites on the night sky. Technological, environmental, and societal impact of Astrophotography. This course affords students the ability to critically examine and evaluate the principles of the scientific method, model construction, and use the scientific method to explain natural experiences and phenomena.

Course Description

What impacts (both positive and negative) has technological progress had on our ability to view and appreciate the Cosmos, and on our relationship with the natural world, and how do we best adapt to or mitigate unwanted impacts? Human activity has dramatically increased the brightness of the night sky in much of the world, which has cultural, biological, and scientific impacts. We will take a broad perspective in this course and consider some of the consequences, both intentional and unintended, of technical progress upon our understanding and ability to view the Cosmos. We will consider a few specific cases in our discussions. As part of this course, you will acquire the skills to frame and capture your own stunning images of the day and night sky, while gaining a greater appreciation for our place in the Universe. Taking your own astronomical photos is a central component of this course. From a technical perspective, topics discussed will include operation of telescopes, photographic composition, celestial motions, and the physics of the objects that we observe. The sky will be our canvas in this course, and our canvas will also serve as a reminder of how small we all are in comparison to the grand scale of the Cosmos.

General Education Designation: Physical Sciences (P)

Natural Science courses afford students the ability to critically examine and evaluate the principles of the scientific method, model construction, and use the scientific method to explain natural experiences and phenomena. **Physical Science (P)** is a sub-designation of Natural Science courses at the University of Florida. These courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the physical sciences. Courses focus on major scientific developments and their impacts on society, science and the environment, and the relevant processes that govern physical systems. Students will formulate empirically testable hypotheses derived from the study of physical processes, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

This course accomplishes the [Quest \(https://catalog.ufl.edu/UGRD/academic-programs/general-education/#ufquesttext\)](https://catalog.ufl.edu/UGRD/academic-programs/general-education/#ufquesttext), and [General Education \(https://catalog.ufl.edu/UGRD/academic-programs/general-education/#objectivesandoutcomestext\)](https://catalog.ufl.edu/UGRD/academic-programs/general-education/#objectivesandoutcomestext) objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Prerequisites: Completion of Quest 1 with a minimum grade of C

Required Readings and Works

Books:

- Mike Shaw (2023). The Beginner's Guide to Astrophotography: How to Capture the Cosmos with Any Camera, 1st edition. Rocky Nook.

Recommended Readings

- Woodhouse, Chris (2017). The Astrophotography Manual: A Practical and Scientific Approach to Deep Sky Imaging 2nd Edition. Routledge.
- Lodriguss, Jerry (2021). Smartphone Astrophotography: An Introduction to Photographing the Heavens. AstroPix LL
- Thierry Legault (2014). Astrophotography, 1st edition. Rocky Nook.

Additional Required Reading Material: Articles and websites (links shown below) will be included in Canvas:

Worldwide Light Pollution Map:

- <https://www.lightpollutionmap.info/>

Impact of Man-Made Satellites on the Night Sky:

- [Starlink Corporate Web Page](#)
- Resnick, Brian (2020). [“The night sky is increasingly dystopian”, Vox, 29 Jan 2020](#)
- Collier, Kevin (2022). [“Starlink internet becomes a lifeline for Ukrainians”, NBC News, 29 Apr 2022](#)
- Young, Chris (2022). [“Could Amazon's satellite service steal the lead from SpaceX's Starlink?”, Interesting Engineering, 14, Apr 2022](#)
- Velazco, Chris (2021). [“The latest space race is all about improving Internet access. Here's what you should know.” Washington Post, 2 Nov 2021](#)
- Zhang, Emily (2020). [“SpaceX's Dark Satellites Are Still Too Bright for Astronomers”, Scientific American, 10 Sept 2020](#)
- Clery, Daniel (2020). [“Starlink already threatens optical astronomy. Now, radio astronomers are worried”, Science, 9 Oct 2020](#)
- Pultarova, Tereza (2021). [“Astronomers ask UN committee to protect night skies from megaconstellations”, Space.com, 27 Apr 2021](#)
- James, Chaneil (2021). [“Dark-coated Starlink satellites are better but not perfect, say astronomers”, Physics World, 13 Jan 2021](#)
- Tobin, Meaghan (2022). [“Just 2% of Starlink users live outside of the West, data suggests”, Rest of the World, 28, Apr 2022](#)
- Pultarova, Tereza (2022). [“Megaconstellations like SpaceX's Starlink may interfere with search for life by world's largest radio telescope”, space.com, 3 Feb 2022](#)

Impact of Light Pollution on Wildlife:

- Stanley, Thomas R., et. Al (2020). [“Brightness of the Night Sky Affects Loggerhead”, Stanley et al. 2020, Frontiers in Marine Science](#)
- [“Light Pollution Effects on Wildlife and Ecosystems”, darksky.org](#)

- [“Sea Turtle Conservation”, darksky.org](https://darksy.org/sea-turtle-conservation/)
- [“Light Pollution Can Harm Wildlife,” darksy.org](https://darksy.org/light-pollution-can-harm-wildlife/)

Cultural Impact of the Thirty Meter Telescope (TMT):

- [TMT Observatory Overview](#) and [TMT Science Themes](#)
- [“Mauna Kea and TMT Information Fact Check”, University of Hawaii](#)
- Witze, Alexandra (2019). [“Hawaii Telescope Protest Shuts Down 13 Observatories on Mauna Kea”, Scientific American, 22 Jul 2019](#)
- Cannon, Jay (2019). [“‘The Rock’ Joins Hawaiian protesters in demonstration against massive telescope”, USA Today](#)
- Witze, Alexandra (2020). [“How the fight over a Hawaii mega-telescope could change astronomy”, Nature, 14 Jan 2020](#)
- Yoshimura, Kailee (2021). [“Astronomers want the Thirty Meter Telescope on a sacred Hawaiian summit. But who is it for?”, Massive Science, 20 Jun 2021](#)

Local Light Pollution Impact of the Proposed Northern Turnpike Extension:

- [Newborn, Steve \(2021\). “A northern extension of the Florida Turnpike is moving ahead, despite public opposition”, WUSF, 8 Dec 2021](#)
- Bushman, Heather (2022). [“Florida Turnpike Extension threatens rural land”, WUFT, 2 Feb 2022](#)
- Callahan, Joe (2021). ["Meeting about northern Florida Turnpike extension draws hundreds to CF's Levy campus", ocala.com, December 2021](#)
- Cubbage, Jan (2022). ["When it comes to a toll road in southwest Marion County, 'no build' is a no brainer", ocala.com, January 2022](#)

Required Materials:

- Cellphone equipped with a camera, or a DSLR camera
- Tripod with extendable legs
- Stellarium Mobile Plus (mobile app)
- NightCap (mobile app) or similar app capable of manual control of cellphone camera
- SIRIL.org image processing program (free)
- Bluetooth shutter remote (for example, <https://a.co/d/6ICKEnM>)
- Flashlight with a red filter (red bicycle light)

Materials will be available through the following means: Textbook is available at UF Bookstore and on amazon; Reading material will be made available on Canvas; other required material available on web.

Materials Fee: N/A

III. Graded Work

Description of Graded Work

Assignment	Description	Requirements	Percentage
Attendance	Requirements for class attendance in this course are consistent with university policies.	See section VI.	5
Class participation	Consistent, informed, thoughtful, and considerate class participation is required. Periodic presentations of photographs to the class, orally describing the work completed from the preceding weeks. Final class presentation is included in this assignment.	See section VI.	25
Photojournal compositions	Concise descriptions of photographic techniques and the properties of the astrophysical objects observed in weekly photojournals.	Weekly entries. Weekly topics are listed within the Annotated Weekly Schedule.	40
Assignment	Description	Requirements	Percentage
Written reflection essays	Reflection essays making compelling cases as to why a specific technology should or should not be developed extensively, and discuss mitigations that should be employed if it is developed.	Four (4) short essays (300-500 words in length), assigned during weeks 9, 11, 12, and 13. Topics are listed within the Annotated Weekly Schedule.	30
Total			100

Grading Scale

For information on how UF assigns grade points, visit: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	94 – 100%		C	74 – 76%
A-	90 – 93%		C-	70 – 73%
B+	87 – 89%		D+	67 – 69%
B	84 – 86%		D	64 – 66%
B-	80 – 83%		D-	60 – 63%
C+	77 – 79%		E	<60

Class Attendance & Participation

Attendance:

Attendance at classes is required and comprises 5% of your final grade. Attendance will be taken each week, and students must attend the entire class to get credit. Requirements for class attendance and make-up assignments and other work in this course are consistent with university

policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Class Participation:

Class participation comprises 25% of your final grade.

- Consistent, informed, thoughtful, and considerate class participation is required. Periodic presentations of photographs to the class, orally describing the work completed from the preceding weeks. The final class presentation is included as part of this portion of your grade. The overall participation grade takes into account reflection discussions, in class participation in obtaining photos and image processing, the final presentation, and any other class participation that arises.
- NOTE: If you have personal issues that prohibit you from joining freely in class discussion, e.g., shyness, language barriers, etc., see the instructor as soon as possible to discuss alternative modes of participation. Each category is evaluated on a scale of 0-2.

The following rubric will be used to evaluate class discussions and participation:

	High Quality (2)	Satisfactory (1)	Needs Improvement (0)
Informed: Shows evidence of having read the readings and/or done the assigned work.	Has grasped all the essential material needed for discussions and participation.	Has grasped the basic material but shows some important lapses or superficial attention to the materials	Shows little to no evidence of having read appropriate materials
Thoughtful: Shows evidence of having understood subject under consideration and any issues raised.	Has given thought and anticipated how to contribute to the discussions, activities and presentations.	Is thoughtful of responses to questions and discussions	Shows little interest in the issues raised
Considerate: Takes the perspective of others into account.	Engages actively, creatively and respectfully in participating in the class	Is tolerant of the perspectives of others but does not show much interest or engagement in other points of view	Is disrespectful of the views of others
Proactive: Actively engages in the process of capturing and refining images.	Arrives prepared with required equipment and materials, actively engages in taking photos, sets up and uses equipment properly and carefully, demonstrates a high level of care and thought in setting up shots, experimenting with techniques, and seeks feedback to improve photographic skills.	Arrives partially prepared with required materials, adequate engagement in taking photos, attempts to learn how to use equipment properly and carefully, exhibits a reasonable level of care and thought in setting up shots, experimenting with techniques.	Does not arrive with required material, does not engage in taking photos, does not set up equipment properly or carefully and shows no interest in learning or improving, puts no thought into photo composition.

Photojournal Compositions & Reflection Essays

Photojournal compositions, presenting your photographs and a description of the subjects and techniques used to acquire photos will be due weekly. These compositions will comprise 40% of your total grade. All compositions will have equal weighting. In addition, you will write four short reflection essays centered on four key discussion themes about the impact of technology on us. These essays are based on assigned readings and class discussion. All essays have equal weight and together they will comprise 30% of your total grade. More details about the reflection essays can be found in Section V, #2, on page 12 of this syllabus. The topics and due dates for the essays are listed in the course schedule in Section III pages 9-10.

The following rubric will be used to evaluate the reflection essays and journal entries:

	Exceeds Expectations 4 pts	Meets Expectation 3pts	Needs Improvement 2 pts	Unsatisfactory 1 pt
Communication: Clearly and respectfully conveys the meaning and relevance of the assignment.	A clear, compelling, respectful, and effective communication of the meaning of the experience in a manner that intentionally conveys the significance and relevance of the experience.	A respectful and effective communication about the experience in a manner that conveys the general significance and relevance.	A basic communication of the meaning of the experience in manner that minimally conveys the significance and relevance of the experience.	A disorganized communication of the meaning of the experience in a manner that conveys unclearly or misrepresents the significance and relevance of the experience
Content: Describes and explains the learning experience.	A detailed and thorough description and explanation of the learning experience.	A basic explanation of the learning experience.	A partial description of the learning experience.	An inconsistent or contradictory description of the learning experience.
Critical Thinking: Analyzes, evaluates, and synthesizes the learning experience to advance personal understanding.	An insightful and perceptive analysis of the learning experience and its value to the student's personal and professional growth.	A basic analysis of the learning experience and its value to the student's personal and professional growth.	A minimal and/or indifferent analysis of the learning experience and its value to the student's personal and professional growth.	A superficial and/or disengaged analysis of the learning experience and its value to the student's personal and professional growth.
Personal Connection/Growth: Connects the course learning experiences to life and personal relevance and meaning-making.	A thoughtful, profound, and insightful connection of the student's course learning experiences to previous learning and/or the student's intellectual, personal, and professional growth.	A basic connection of the student's course learning experiences to personal and life relevance and meaning-making	A partial and incomplete connection student's course learning experiences to previous learning and/or the student's intellectual, personal, and professional growth.	Provides a superficial connection student's course learning experiences to personal and life relevance and meaning-making

III. Tentative Weekly Schedule (subject to change due to weather) see Canvas for weekly topic and assignment

Week	Topics, Homework, and Assignments ¹
Week 1	• Topic: Astronomy & Astrophotography Primer – What is Astrophotography • Summary: Introduction to basic astronomy and astrophysics principles. Discuss photographic equipment, astronomical targets, and the goals for the course. • Required Readings/Works: Beginner's Guide to Astrophotography: Chapter 1; examine https://www.lightpollutionmap.info/. • Assignment: Photojournal. Composition: Daytime sky with some foreground (Sunrise/sunset).
Week 2	• Topic: Astronomy & Astrophotography Primer: Equipment & Technique • Summary: Introduction to manual cellphone camera modes, DSLR cameras, cooled CMOS/CCD cameras, and the different types of mounts required to track celestial objects. This lesson will build on the prior week's lesson. • Required Readings/Works: Beginner's Guide to Astrophotography: Chapter 3. • Assignment: Photojournal. Sky photos with mount and shutter remote.
Week 3	• Topic: Understanding the Night Sky • Summary: Discuss motions of astronomical objects • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 2. • Assignment: Photojournal. Composition: The Moon
Week 4	• Topic: Moon, Constellations, Magnitudes and Observing Techniques • Summary: Continue discussion of prior weeks' astronomy and astrophotography primers. Discuss ways to maximize the equipment that you possess to produce the best results. Autofocus, Manual Focus, Filters, Exposure times, Zoom, F-ratios, Steps for Focusing with a Bhatinov Masks, Focus Through Trial and Error Exploring how exposure time and camera gain (ISO) can impact your image. • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 4, pg 63-80 Assignment: Photojournal. Composition: Constellations
Week 5	• Topics: Sky Brightness and More Observing Techniques • Summary: Continue with prior discussions on astronomy and astrophotography primers and observing techniques. Sky brightness, scattering of Light (both for light pollution and halos around objects), why the sky is blue and sunsets are red, atmospheric turbulence. Introduction to concept of long exposure astrophotography, Time-lapse Imaging, Golden Rule, Gain/Offset, Panoramas, Calibration Frames. • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 4, pg 81-97 • Assignment: Photojournal. Composition: Star Trails
Week 6	• Topics: Using Telescopes • Summary: work with class telescopes to get deep sky images & discuss image processing • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 5.

¹ In-class assignments are subject to cooperative weather. In the event of rain or thick cloud cover, class will remain indoors and will focus on observational techniques, image processing and/or discussions on topics relevant to that day's lesson.

Week	Topics, Homework, and Assignments ¹
	• Assignment: Photojournal. Composition: Night Sky + Telescope. Online measurement of sky brightness
Week 7	• Topics: History of Astronomy and Astrophotography • Summary: Discussion of the historical importance of the night sky, Planets, Galileo's Discovery of Moons of Jupiter, Heliocentric Model, and introduction to image processing and magnification • Required Reading/Works: (Beginner's Guide to Astrophotography: Chapter 6. • Assignment: Photojournal. Composition: Planets and at-home image processing.
Week 8	• Topics: Star Formation • Summary: Discussion on Giant Molecular Clouds as stellar nurseries, Orion Nebula, and use of wide-angle photography. • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 7. • Assignment: Photojournal. Composition: Pleiades/Orion, or other large/bright target. At-home image processing.
Week 9	• Topics: Artificial Space Debris • Summary: Discussion on man-made satellites (Starlink), space debris, impact on astrophotography and space science. Learn to use satellite finding apps to locate man-made satellites, the ISS, and Hubble/Webb space telescopes. • Required Reading/Works: Articles from the "Impact of Man-Made Satellites on the Night Sky" Reading List. Class will be divided in two groups and each group will be assigned half of the articles from the reading list. • Assignment: Photojournal. Composition: Sunset. At-home reflection on Starlink discussion (300-500 words).
Week 10	• Topics: Trip to Rosemary Hill Observatory in Bronson, Florida • Summary: Explore the telescopes at RHO and compare sky brightness here to that at the Campus Teaching Observatory. • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 8. • Assignment: Use planetarium program to plan an observing run; capture a long exposure image of the sky that purposefully includes a satellite/Hubble/Webb/ISS streak.
Week 11	• Topics: More Observing Techniques and Post-Processing Techniques, and Impacts of Light Pollution • Summary: Discussion of light pollution and how it impacts sea turtle populations. • Required Reading/Works: All articles from the "Impact of Light Pollution on Wildlife" Reading List. • Assignment: Photojournal. Composition: Free choice. At-home reflection on sea turtle discussion (300-500 words).
Week 12	• Topics: Observing Techniques • Summary: Discussion of light pollution impacts on Rosemary Hill Observatory/Campus Teaching Observatory/Your Own Images, and how light pollution has created a disconnect between modern-day civilization and much of our shared history. Incorporating time-lapse photography into your arsenal. • Required Reading/Works: All articles from the "Local Light Pollution Impact of the Proposed Northern Turnpike Extension" Reading List. • Assignment: Photojournal. Composition: Time-lapse video. At-home reflection on light pollution impacts discussion (300-500 words).

Week	Topics, Homework, and Assignments ¹
Week 13	• Topics: Observing Techniques • Summary: Continue with prior discussions on astronomy primer and observing techniques. Continue to explore creative ways to capture the sky. Build on prior weeks' skills/techniques. Discussion on Mauna Kea cultural impacts of TMT. • Required Reading/Works: All articles from the "Cultural Impact of the Thirty Meter Telescope (TMT)" Reading List. • Assignment: Photojournal. Composition: Free choice. At-home reflection on Mauna Kea TMT discussion (300-500 words).
Week 14	• Topics: Observing Techniques • Summary: Discussion on meteor showers. How to know when they happen, how to see them, how to image them. Discussion on the Milky Way & Zodiacal light • Required Reading/Works: Beginner's Guide to Astrophotography: Chapter 9. • Assignment: Photojournal. Composition: Free choice.
Week 15	• Topics: Photojournal Presentations • Summary: Class discussion on the techniques acquired and honed during the course, what you learned, how you will use what you have learned in the future, and how the course has impacted your appreciation of the visible universe. • Required Reading/Works: N/A • Assignment: Class presentation, discussion on the semester's best astrophotography captures.

IV. Course Goals and Student Learning Outcomes (SLOs)

General Education Course Objectives - Physical Sciences (P) and Quest 2 (Q2)

This course will:

- **Introduce the basic concepts and techniques** of astrophotography, exploring the physical sciences behind imaging celestial objects and understanding the interaction of light with cameras and telescopes. (P, Q2)
- **Introduce basic concepts** of astrophysics, such as celestial motions, and objects, including the moon, planets and stars and galaxies. (P, Q2)
- **Cover key scientific and technological developments** that have advanced astrophotography and explore how they have impacted both professional astronomy and amateur pursuits of the night sky. Students will learn about both positive and negative consequences of technological advancements, such as light pollution and satellite constellations. (P, Q2)
- **Enable students to operate telescopes and cameras**, both DSLR and smartphone-based, and use appropriate image processing software to capture and analyze stunning images of astronomical objects, from the Moon to distant nebulae. (P, Q2)
- **Explore the interplay between light pollution, technology, and society**, focusing on how urbanization and human activities affect our ability to view and appreciate the night sky, and how astronomers and environmentalists work to mitigate these effects. (Q2)

- **Encourage critical thinking** by having students plan and execute observations, reflect on the cultural and environmental impacts of light pollution, artificial satellites, and other technological developments, and assess the trade-offs involved in modern scientific exploration. (P, Q2)
- **Provide hands-on experiences**, such as field trips to observatories and outdoor nighttime observations, giving students the opportunity to apply the skills learned in class to real-world environments and observe how different locations impact image quality. (Q2)
- **Develop students' ability to communicate** scientific concepts effectively by maintaining photojournals and reflecting on how astrophotography informs their understanding of both science and society. Students will present their images and written reflections, fostering skills in both visual and written communication. (P, Q2)

Student Learning Outcomes - Physical Sciences (P) and Quest2 (Q2)

At the end of this course, students will be able to

Content

- **Identify and explain** key astrophysical concepts, including celestial motion, the physics of stars, planets, and nebulae, and how these are captured through astrophotography. Students will demonstrate this through photojournal entries and class discussions. (P, Q2)
- **Describe and analyze** the effects of technological progress, such as light pollution and satellite constellations, on the ability to observe the night sky and how these have scientific, cultural, and environmental impacts. Competency will be assessed through written reflection essays and in-class discussions. (P, Q2)

Critical Thinking

- **Plan, obtain and process** astronomical images by using telescopes, cameras, and image processing software. Students will predict the effects of different variables (e.g., location, light conditions) on image quality, and will evaluate their results through reflective photojournals and class discussions. (P, Q2)
- **Examine and assess** the environmental and societal consequences of technological developments, such as light pollution and artificial satellites, on astronomy and sky observation. Students will evaluate these issues through in-class debates and reflection essays, exploring how trade-offs are made in modern scientific exploration. (Q2)

Communication

- **Communicate scientific concepts** effectively by maintaining photojournals that document photographic techniques and scientific reflections. Students will present their photos and provide detailed explanations of the astrophysical objects captured, fostering their skills in both visual and written communication. This will be assessed through presentations and photojournals. (P, Q2)
- **Discuss and present** the societal impacts of light pollution and satellite constellations, and **advocate** for solutions to mitigate these effects. Students will be assessed through presentations and final reflective essays. (Q2)

Connection

- **Connect course content** with real-world environmental and technological challenges by reflecting on the cultural and scientific significance of the night sky, and how human activity impacts our ability to appreciate and study the cosmos. Students will connect their personal astrophotography experiences with these broader issues in reflective essays and class discussions. (Q2)
- **Reflect on the interplay** between technological progress, environmental concerns, and cultural perspectives, particularly in the context of urbanization and space exploration. Students will explore these themes through written reflections and oral presentations, drawing connections between their observations and societal trends. (Q2)

V. Quest Learning Experiences

1. Details of Experiential Learning Component

This course is by design primarily experiential. Two-thirds of the course time each week will be devoted to hands-on training in astrophotography, including use of the UF observatories, and the weekly assignments require traveling around the local area to explore the night sky. Students will apply the fundamentals of photographic composition and knowledge of the night sky, using their smartphones to take images of solar system objects, constellations, and nebulae. During the first part of the class the in-class instruction will focus upon teaching students to take good photographs, and the class will explore campus together as they take images from various locations. During the latter part of the semester, field trips to the UF Campus Teaching Observatory and Rosemary Hill Observatory will allow students to directly compare bright and dark locations and use telescopes. The assignments outside of class can be done any evening, so conflicts will not be an issue.

2. Details of Self-Reflection Component

There are four key discussion themes planned for the second half of the semester (during the first half the emphasis must be on the basics of astronomy and photography): 1) Impact of Man-Made Satellites on the Night Sky, 2) Impact of Light Pollution on Wildlife, 3) Cultural Impact of the Thirty Meter Telescope (TMT), and 4) Local Light Pollution Impact of the Proposed Northern Turnpike Extension. The main theme is using the concept of light pollution to discuss the combination of benefits and costs associated with any technology. We will have interactive discussions in class where students will share their perspectives on how to balance these considerations and for each topic they must decide for themselves what the appropriate balance may be. They will be required to write reflections after each of these discussions explaining their personal perspective, justifying this perspective, and consider whether there exist alternatives which might be preferable or mitigation strategies that sufficiently address some of the negative consequences.

VI. Procedure for Conflict Resolution

Any classroom issues, disagreements or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact Associate Chair, Naibi Marinas (marinas@ufl.edu, [352-294-1859](tel:352-294-1859)). Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the University Ombuds Office (<http://www.ombuds.ufl.edu>; [352-392-1308](tel:352-392-1308)) or the Dean of Students Office (<http://www.dso.ufl.edu>; [352-392-1261](tel:352-392-1261)).