STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

American Public University System

The Ultimate Advantage is an Educated Mind

School: School of Science and Technology Course Number: SPST340 Course Name: Tools of the Observatory Credit Hours: 3 Length of Course: 8 weeks



COURSE DESCRIPTION (CATALOG)

SPST340 Tools of the Observatory (3 Hours)

This course is designed to familiarize students with the tools used by the astronomer in the observatory. Such tools include telescopes and astronomical imaging cameras. Students will have the opportunity to use the APUS remote observatory. The course will also introduce students to career opportunities as night telescope operators at astronomical observatories.

COURSE SCOPE

An overview of the development, design, and usage of astronomical observatories – with emphasis on telescopes – is considered within the scope of this course. Participants will have an opportunity to learn about the most significant ground and space-born observatories across the electromagnetic spectrum, as well as multi-messenger astronomy. Students will learn about types of instruments, telescope features, and programs used by observers. Methods of processing light, including active and adaptive optics, plus interferometry will be also considered.

COURSE OBJECTIVES

Upon completion of this course, the student will be able to:

- Summarize the historical development of astronomical instrumentation.
- Describe issues that may affect telescope optical quality.
- Discuss the various methods of analyzing light (e.g., spectroscopy, photometry, and interferometry).
- Describe the different astronomical detectors and how they operate (e.g. CCD imaging cameras).
- List the major astronomical observatories across the globe and in space.
- Evaluate advanced telescopic techniques such as active and adaptive optics.
- Discuss astronomical instrumentation for use across the electromagnetic spectrum.

- Discuss astronomical instrumentation and discoveries outside the electromagnetic spectrum.
- Summarize "cutting-edge" discoveries made via astronomical instrumentation.

 Operate
 astronomical programs relevant to observatory operation.
 Create a telescopic observing
 schedule and target selection.

COURSE DELIVERY METHOD

SPST340 is delivered to you via the online Learning Management System (LMS). Distance learning will enable students to complete academic work in a flexible manner, completely online.

COURSE MATERIALS

Course Textbook:

No textbook for this course. Required reading and video materials will be included in the Lesson Modules of each week.

Additional Reading:

Announcements, discussions, online lessons, selected articles, and videos.

Websites:

In addition to the required course texts and videos, public domain websites are useful for completing the weekly assignments (e.g. NASA and ESA sites). Please abide by the university's academic honesty policy when using Internet sources and cite all information with proper APA style.

Other Resources:

As provided



EVALUATION PROCEDURES

Your final grade will consist of an average of the following items:

Discussion Participation: Eight times throughout this course discussion items will be posted within the Discussion area of the classroom. Your responses should be in YOUR OWN WORDS, well written and grammatically correct. Sources used must be attributed at the end of your posting. Opinions are always welcome... However, postings providing only opinions will be graded accordingly! Be sure to read the directions associated with each posting.

Weekly Quizzes: Quizzes are designed to review assigned reading and/or video assignments. Quizzes are to be taken online, and you will get two attempts at each quiz to help you master the material. The highest score of the two attempts is the one that is kept. Quizzes must be taken during specific dates. Although **open book** (meaning you may reference material provided in the course), students are not to give or receive help on the weekly quizzes.

Homework Assignments: There are six homework assignments for this course, each covering various aspects of assigned course readings and materials. Information on homework assignments will be posted within the Assignments area of the classroom.

Final Paper: At the end of week 8 you will turn in a final paper. An outline or draft of the paper topic will be submitted during week 7.

Assignments	% of Grade
Discussion Postings (8 total – 3 points each)	24
Weekly Quizzes (8 total – 3 points each)	24
Homework Assignments (6 total – 6 points each)	36
Final Paper (draft and final product)	16
Total	100 nts

Your efforts in this course will be evaluated based upon the following:

GRADING SCALE: Please see the <u>Student Handbook</u> to review the University's grading scale.



COURSE OUTLINE

Week	Topics & Learning Objectives	Readings/Assignments
1	 Introduction Tour of the Electromagnetic Spectrum Telescope – introduction and history Coding 	Lesson, Reading & Resources Discussion – Introduction Quiz 1 Assignment 1

2	 Ground-based Optical Observatories Instruments CCD detectors Planning an observing run 	Les Dis Qu As:	Lesson, Reading & Resources Discussion – APOD Quiz 2 Assignment 2	
3	 <i>Telescopes in Space</i> Hubble Space Telescope Pointing a space telescope Filters 	Les Disc Tele Qu As:	Lesson, Reading & Resources Discussion –Hubble Space Telescope Quiz 3 Assignment 3	
4	 Infrared Observatories Spitzer Space Telescope Signal-to-Noise ratio Binning, Stacking, Exposure times. 	Les Dis Tel Qu As:	Lesson, Reading & Resources Discussion –Spitzer Space Telescope Quiz 4 Assignment 4	
5	 <i>Radio and Microwave Observatories</i> ALMA, VLA, Arecibo Angular Resolution Interferometry Planck Mission and the CMB 	Les Dis Qu As:	Lesson, Reading & Resources Discussion – ALMA Quiz 5 Assignment 5	
6	 High Energy Instruments and Telescopes Spectroscopy and spectral Resolution Cosmic Origins Spectrograph Chandra and Fermi 	Les Dis Go Qu As:	Lesson, Reading & Resources Discussion – X-ray and Educational Goals Quiz 6 Assignment 6	
7	 Multimessenger Gravitational Waves Neutrinos Cosmic Rays 		Lesson, Reading & Resources Discussion – Telescope Names Quiz 7 Draft of Final Paper	
8	 Telescopes of Tomorrow James Webb Space Telescope 30-m ground-based observatories Large surveys Adaptive Optics 		Lesson, Reading & Resources Discussion – Future Observatories Quiz 8 Final Paper	

POLICIES: Please see the <u>Student Handbook</u> to review University policies regarding Drops/ Withdrawals, Plagiarism, Extensions, and Disability Accommodations.

WRITING EXPECTATIONS

All written submissions should be submitted in a font and page set-up that is readable and neat. It is recommended that students try to adhere to a consistent format, which is described below.

- Typewritten in double-spaced format with a readable style and font and submitted inside the electronic classroom (unless classroom access is not possible and other arrangements have been approved by the professor).
- Arial 11 or 12-point font or Times New Roman styles.

• Page margins Top, Bottom, Left Side and Right Side = 1 inch, with reasonable accommodation being made for special situations and online submission variances.

CITATION AND REFERENCE STYLE

Assignments completed in a narrative essay or composition format must follow APA Style Guideline. For examples and more specific information see the resources available at the <u>Trefry</u> Library.

LATE ASSIGNMENTS

• The University encourages all work to be completed according to the course schedule. The University Late Work Policy can be found in the Student Handbook <u>here</u>.

NETIQUETTE

Online universities promote the advance of knowledge through positive and constructive debateboth inside and outside the classroom. Discussions on the Internet, however, can occasionally degenerate into needless insults and "flaming." Such activity and the loss of good manners are not acceptable in a university setting--basic academic rules of good behavior and proper "Netiquette" must persist. Remember that you are in a place for the fun and excitement of learning that does not include descent to personal attacks, or student attempts to stifle the discussion of others.

□ **Humor Note:** Despite the best of intentions, jokes and--especially--satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add "emoticons" to help alert your readers: ;-), :), ☺



ACADEMIC SERVICES

ONLINE LIBRARY RESEARCH CENTER & LEARNING RESOURCES

The Online Library Resource Center is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search engines on the open Web. In addition, the Center provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to <u>orc@apus.edu</u>.

- **Charles Town Library and Inter Library Loan:** The University maintains a special library with a limited number of supporting volumes, collection of our professors' publication, and services to search and borrow research books and articles from other libraries.
- *Electronic Books:* You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.

- *Electronic Journals:* The University provides access to over 12,000 journals, which are available in electronic form and only through limited subscription services.
- **Turnitin.com:** a web-based plagiarism prevention application licensed for campus use through the APUS Online Library. All students should signup for an APUS student profile. With an APUS student profile, students can submit class assignments, as directed by instructors. Students also can use Turnitin outside of enrolled courses, as a learning tool, uploading and checking their work to avoid instances of inadvertent plagiarism.
- *Tutor.com:* Students have access to 10 free hours of tutoring service per year through <u>Tutor.com.</u> Tutoring is available in the following subjects: math (basic math through advanced calculus), science (biology, chemistry, and physics), accounting, statistics, economics, Spanish, writing, grammar, and more.



DISLCAIMER STATEMENT

Course content may vary from the outline to meet the needs of this particular group.