

 FLORIDA ATLANTIC UNIVERSITY	NEW COURSE PROPOSAL Undergraduate Programs		UUPC Approval <u>3/25/24</u> UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner Posted _____ Catalog _____
	Department <u>Physics</u> College <u>Charles E. Schmidt College of Science</u> <i>(To obtain a course number, contact erudolph@fau.edu)</i>		
Prefix <u>AST</u> Number <u>4402</u>	<i>(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)</i> Lab Code _____	Type of Course <input type="text" value="Lecture"/>	Course Title <u>Galaxies and Cosmology</u>
Credits <i>(See Definition of a Credit Hour)</i> <u>3</u>	Grading <i>(Select One Option)</i> Regular <input checked="" type="radio"/> Sat/UnSat <input type="radio"/>	Course Description <i>(Syllabus must be attached; see Template and Guidelines)</i> <u>Study of different types of galaxies, their evolution, their relationship to active galaxies and quasars and the evolution of the Universe.</u>	
Effective Date <i>(TERM & YEAR)</i> <u>Fall 2024</u>	Prerequisites, with minimum grade* <u>AST 2002 and (PHY 2053 or PHY 2048)</u> <u>All with "C" or higher</u>		Corequisites <u>(PHY 2053 or PHY 2048)</u>
		Registration Controls <i>(Major, College, Level)</i>	
<i>*Default minimum passing grade is D-. Prereqs., Coreqs. & Reg. Controls are enforced for all sections of course</i>			
WAC/Gordon Rule Course <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to proposal. See <u>WAC Guidelines</u> .		Intellectual Foundations Program (General Education) Requirement <i>(Select One Option)</i> None General Education criteria must be indicated in the syllabus and approval attached to the proposal. See <u>Intellectual Foundations Guidelines</u> .	
Minimum qualifications to teach course <u>M.S. in Physics or related field</u>			
Faculty Contact/Email/Phone <u>Ata Sarajedini / asarajedi@fau.edu / 352-281-4286</u>		List/Attach comments from departments affected by new course	
Approved by Department Chair _____ College Curriculum Chair _____ College Dean _____ UUPC Chair <u>Korey Sorge</u> Undergraduate Studies Dean <u>Dan Meeroff</u> UFS President _____ Provost _____		Date <u>3/11/24</u> <u>3/13/24</u> <u>3/13/24</u> <u>3/25/24</u> <u>3/25/24</u>	

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

AST 4402-001
Galaxies and Cosmology

MWF 11:00 – 11:50
3 credits

Semester, Year
Prof. XXXXX YYYYY
Office: XXXXXX
Office hours: MWF 11-12
Classroom: XXXX
Telephone: 561-297-XXXX
Email: zzzzz@fau.edu



TA name	xxxxxx xxxxxxxxxxxx
Office	xxxxxxxxx
Office hours	MWF xx:xx – xx:xx
Telephone	561-297-xxxx
Email	xxxxxx@fau.edu

Catalog Description

Study of different types of galaxies, their evolution, their relationship to active galaxies and quasars and the evolution of the Universe.

Course Description

In this course, we will investigate the properties of galaxies and their distribution in space. We will discuss the various types of galaxies and astrophysical processes involved in galaxy evolution. We introduce cosmological models that describe our Universe as well as the observations used to test those models.

Instructional Method

In-Person. There is no remote option for this course.

Prerequisites

- AST 2002 and
- (PHY 2053 or PHY 2048)
- All prerequisites with a "C" or higher

Corequisites

- (PHY 2053 or PHY 2048)

Course Objectives/Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Understand and characterize the different types of galaxies in the Universe.
2. Understand how we measure properties of distant galaxies.
3. Apply the laws of physics to infer how galaxies form and evolve.
4. Understand the different cosmological models that can be used to describe our Universe.
5. Discern the use of cosmological observations for testing various evolutionary models.

Course Evaluation Method

Attendance (10%)

Term-Projects (40%)

Projects will use archival and literature data to analyze galaxies from extragalactic surveys.

Midterm Exam (20%)

Exam will use a combination of multiple choice and short answer responses to cover the material presented in the first half of the semester.

Final Exam (30%)

Exam will use a combination of multiple choice and short answer responses to cover the material presented during the entire semester with emphasis on the second half of the semester.

Course Grading Scale

total points	90-100	87-90	84-87	80-84	77-80	74-77	70-74	67-70	64-67	60-64	57-60	<60
grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

Policy on Makeup Tests, Late Work, and Incompletes

Students are expected to complete all requirements by the specified due dates. If a student misses class or an assignment due to circumstances beyond their control and provides the instructor with timely notification, they will be allowed a reasonable time to make up the missed work. The format of a make-up test/exam will be at the discretion of the instructor.

Students will not be penalized for absences due to participation in University-approved activities, including athletic or scholastics teams, musical / theatrical performances, or debate activities. These students will be allowed to make up missed work without any reduction in the student's final course grade. Reasonable accommodation will also be made for students participating in a religious observance. Also, note that grades of Incomplete ("I") are reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances. A grade of "I" will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student must show exceptional circumstances why requirements cannot be met. A request for an incomplete grade must be made in writing with supporting documentation, where appropriate.

Policy on the Recording of Lectures

Because of a new Florida Statute in 2021, the following model language is suggested for inclusion in course syllabi, at the discretion of individual faculty:

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see [University Regulation 4.001](#).

Academic Integrity Policy Clarification for this Course:

In this section I would like to clarify points that may not be obvious in the previous section.

- If I feel that academic irregularity has occurred, we will schedule a meeting. You will have a chance to give your side of the story. If you can convince me that there is not problem, the matter is dropped.
- During this meeting, if you a) admit to offending behavior or b) can't convince me of your innocence, the University Registrar will be contacted to put a mark on your record. There may be additional penalties as well.
- You will follow the guidelines in University Regulation 4.001 to appeal the mark on your transcript (and/or additional penalties) if you feel you are innocent.
- As is listed in (4).(C) of University Regulation 4.001... "a repeat offense, even if the notation of violation of the Code of Academic Integrity from the first offense had been expunged from the official transcript as a result of successful completion of the peer counseling program, the student will be expelled from the University."
- The penalties for cheating and violations of the Code of Academic Integrity escalate quickly and are severe. Do not ignore this warning.

Required Texts/Readings

“Galaxies in the Universe”, Sparke and Gallagher, 2nd edition

Course Topics

- Galaxy classification
- Spirals and lenticulars -- stars, gas, dust; spiral structure, star formation; spheroidal component; dark matter; supermassive black holes
- Ellipticals -- stars, gas, dust; dark matter; supermassive black holes
- Distribution of galaxies -- groups, clusters, galaxy types in each; mergers, stripping; large-scale structure (superclusters, voids); evolution
- Active galactic nuclei -- quasars, spectra; unified theory, other forms (radio galaxies, Seyfert and N galaxies, blazars/BL Lacs)
- Cosmological models -- general relativity and geometry of spacetime; Einstein, de Sitter-Ehrenfest, Friedmann-Robertson-Walker, Eddington-Lemaitre, Lemaitre models; critical density, deceleration parameter
- Big Bang cosmology -- thermal history of Universe, early conditions; four forces, unification, eras
- Observational cosmology -- finding H_0 , q_0 , $\Omega_{m,0}$, $\Omega_{\Lambda,0}$, $\Omega_{b,0}$; precision cosmology, WMAP and Planck