AST6309: Galaxies and Cosmology
(Galactic and Extragalactic Astronomy)

Professor Vicki Sarajedini

vicki@astro.ufl.edu

Webpage: www.astro.ufl.edu/~vicki/ast6309.html

Meeting Times: MWF 8th period (3:00pm – 3:50pm)

Location: BRT 3

Office Hours: MW 11:00am – noon

Text Books: Galactic Astronomy - Binney & Merrifield
Galactic Dynamics - Binney & Tremaine
Galaxies in the Universe - Sparke & Gallagher
Cosmology: The Origin and Evolution of Structure - Coles & Lucchin

This course is one of several core courses required in the graduate astronomy curriculum but is also open to interested students in other departments. In addition to a general familiarity with astronomy at the introductory level, the course requires knowledge of calculus and differential equations. It aims to provide an observational survey of the general characteristics of galaxies, introduction to the methods of stellar dynamics and their application to galaxies, and the theoretical underpinnings of modern cosmology. The intent is to cover both the fundamental topics in the field and explore areas that are the subject of active research in the field.

Specific Topics to be covered include:

- Galaxy classification and photometric properties of galaxies
- Spirals and Ellipticals: ISM, kinematics, dark matter
- Gravitational potentials and stellar orbits for axisymmetric and non-axisymmetric systems: Virial theorem, Jean's equation, Epicycle Theory for disks, Boltzmann equation, Jean's instability
- Galaxy environment and interactions: clusters, groups, large-scale structure
- Galaxy Luminosity Functions
- Active Galaxies and Supermassive Black Holes
- Classical Physical Cosmology: Friedmann Equations, Robertson-Walker Metric, Le Maitre Universes
- Thermal History of the Universe
- Nucleosynthesis
- Structure Formation and Evolution, Large Scale Structure
- Cosmic Microwave Background

Most lectures will be in PowerPoint and will be provided at the course website. Other notes will be given in class at the blackboard and should be copied into your notebooks. Reading assignments will be given in class and should be completed before the next class meeting.

Exams: 1 mid-term and 1 final exam (each worth 20%). Students are expected to be present on all exam days and should notify the instructor immediately if it is not possible to take the exam on the specified date. Make-up exams will be given in individual cases when warranted.

Homework: I will assign 5 homework assignments throughout the semester (each worth 10%). Working in groups is accepted, although each student is required to show all work and hand in separate homework solutions.

Presentation: Each student will present a 10-minute talk on a subtopic of extragalactic astronomy or cosmology (worth 10%). The talks will take place during the last two weeks of class. A list of possible topics for the presentation will be given later in the course. There will be no written portion of this assignment.

Grading Information:

See http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades for general UF graduate school grading policies. Your grade for this course will be based on the following:

In class exams – (2 exams -20% each)	**40%**
Homework	**50%**
Presentation	**10%**

Grading scale:

Letter Grade	% Points	GPA	Letter Grade	% Points	GPA	Letter Grade	% Points	GPA
A	>90	4.0	B-	77 - 79	2.67	D+	64 - 66	1.33
A-	87 - 89	3.67	C+	74 - 76	2.33	D	60 - 63	1.0
B+	84 - 86	3.33	C	70 - 73	2.0	D-	57 - 59	0.67
B	80 - 83	3.0	C-	67 - 69	1.67	E	< 56	0

Make-up Policy:

Students are expected to complete all requirements by the specified due dates. If a student misses class or an assignment due to an excused absence as specified in the undergraduate catalog 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.

Course Evaluations:

Students are expected to provide feedback on the quality of this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last few weeks of the semester, and an announcement will be made when they are open. A summary of the results of the assessment can be found at https://evaluations.ufl.edu/results/.

UF Policies:

Honor Code: In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. Student and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code.

On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied:"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

University Policy on Accommodating Students with Disabilities: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

University Policy on Academic Misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

**Netiquette: Communication Courtesy: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. [Describe what is expected and what will occur as a result of improper behavior – http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf

Lecture Schedule

Lecture Date	Lecture Content	Weekly Reading Assignment
Week 1	History of Galactic Astronomy and Galaxy Classification	BM 1.2, 4.1
Week 2	Surface Brightness Profiles of Elliptical Galaxies	BM 4.2-4.3, SG 6.1
Week 3	Surface Brightness Profiles of Spiral Galaxies	BM 4.4, SG 5.1
Week 4	Stellar Populations, ISM and Kinematics of Elliptical Galaxies	BM 4.3, 8.3, 11.1-11.2, SG 6.2-6.4
Week 5 and 6	Kinematics, ISM and Disk Galaxy Properties	BM 8.2, 11.3, SG 5.2-5.5
Week 7 - 8	Potential Theory and Stellar Orbits	BT 2.0-2.2, 3.0-3.4, SG 3
Week 9	Stellar Dynamical Systems	BT 4.1-4.2, SG 3.2-3.4
Week 10	Environment and Galaxy Clustering	BM 4.1.2, SG 7.2-7.3, 8.0-8.1
Week 11	Luminosity Functions, Groups and Mergers	BM 4.1.3, 4.1.4, SG 4.0, 7.1
Week 12	AGN and Related Objects	SG 9.0-9.2
Week 13 and 14	Cosmology	CL Ch1, Ch2, Ch4.5-4.7
Week 15	Big Bang Theory	CL Ch4.8 Ch5, Ch8.6

BM = Binney and Merrifield BT = Binney and Tremaine

SG = Sparke and Gallagher CL = Coles & Lucchin