

# NS209 “What is There in the Universe? Beyond the Milky Way”

## Syllabus [Spring 2023]

**Note:** We may have to revise the course plan according to the reassessment to be made country-wide, regarding higher education, at the beginning of April. The content to be delivered is certain but the method of course delivery, the number and dates of exams, and some other details are subject to change.

### INSTRUCTOR:

Yuki Kaneko ([website](#))

Office: UC 1089

Email: [yuki@sabanciuniv.edu](mailto:yuki@sabanciuniv.edu)

Office hour appointment: <http://calendly.com/yuki-kaneko/office-hour> (in person or online)

**TA:** Ali Arda Gençali [[gencali@sabanciuniv.edu](mailto:gencali@sabanciuniv.edu)]

Please email to make an appointment for an office hour (in person or online)

### CLASS HOURS & PLACES:

The classes will be given **ONLINE** but you may choose to join the sessions from the reserved classroom below if you are on campus.

Monday 12:40-14:30 FENS G055

Tuesday 10:40-11:30 FASS 1076-1078

**Class Zoom link:** <https://sabanciuniv.zoom.us/j/96735026282> (log in with your sabanciuniv account)

**TopHat Join Code:** 006103

### LEARNING GOALS:

By successfully completing this course, the students should be able to demonstrate the general understanding of:

1. the entire universe, how it began and evolved,
2. galaxies and their evolution, and
3. the possible fate of the Universe.

The specific **learning objectives** are defined weekly and available on SUCourse.

### TEXT BOOK:

**E. Chaisson & S. McMillan, ASTRONOMY TODAY , 9th Edition (e-text)**

Access code can be purchased from HOMER Bookstore, through this link:

<https://www.homerbooks.com/urun/astronomy-today-standalone-ebook>

- Once purchased, use the **Course ID: kaneko98621** to join the course.

Note that there is a copy available at IC in the Student Reserve. Also, several older editions of the book are available at IC. Purchasing the book is not required but recommended.

### Supplementary Free Open Textbook:



**Astronomy 2e** [Below chapters are relevant to this course]

- 25 Milky Way Galaxy
- 26 Galaxies
- 27 Active Galaxies, Quasars, and Supermassive Black Holes
- 28 The Evolution and Distribution of Galaxies
- 29 The Big Bang
- 30 Life in the Universe

**COURSE PLAN (TENTATIVE):**

Week	Dates	Contents	Homework
1	Feb 27-28	Introduction + Basics	
2	Mar 6-7	Ch 23: The Milky Way Galaxy <ul style="list-style-type: none"> <li>● Distance Scale &amp; Galactic Structure</li> </ul>	
3	Mar 13-14	<ul style="list-style-type: none"> <li>● Doppler Effect, 21-cm Radiation, Mass of the Milky Way</li> </ul>	
4	Mar 20-21	<ul style="list-style-type: none"> <li>● Formation of the Galaxy, Galactic Dynamics, Rotation Curve, Missing Mass</li> </ul>	1 (March 27)
5	Mar 27-28	Ch 24 Galaxies: Building Blocks of the Universe <ul style="list-style-type: none"> <li>● Galaxies</li> </ul>	
6	Apr 3-4	<ul style="list-style-type: none"> <li>● Hubble's Law</li> <li>● Active Galactic Nuclei</li> </ul>	2 (April 17)
7	Apr 10-11	<ul style="list-style-type: none"> <li>● Active Galactic Nuclei</li> </ul> Ch 25: Galaxies and Dark Matter: The Large-Scale Structure of the Cosmos <ul style="list-style-type: none"> <li>● Dark Matter</li> </ul>	
8	Apr 17-18	<ul style="list-style-type: none"> <li>● Galaxy Formation &amp; Evolution, Black Holes</li> </ul>	
9	Apr 24-25	<b>April 24: Midterm Exam (Ch 23-25.3) ONLINE during the class time</b> <ul style="list-style-type: none"> <li>● Black Holes</li> </ul>	3 (May 9)
10	May 2	<ul style="list-style-type: none"> <li>● Universe on Large Scale</li> <li>● Gamma-Ray Bursts</li> </ul>	

11	May 8-9	Ch 26: Cosmology: The Big Bang and the Fate of the Universe <ul style="list-style-type: none"> <li>Expanding Universe</li> </ul>	
12	May 15-16	<ul style="list-style-type: none"> <li>Dark Energy</li> </ul> Ch 27: The Early Universe: Toward the Beginning of Time <ul style="list-style-type: none"> <li>The Big Bang</li> <li>Radiation Era and Matter Era</li> </ul>	4 (May 29)
13	May 22-23	<ul style="list-style-type: none"> <li>The Formation of Structure of Universe</li> <li>The Problems with Big Bang</li> </ul>	5 (June 1)
14	May 29-30	Review	
	<b>Jun 4, Sun 16:00-18:00</b>	<b>Final Exam (only covers Ch 25.4-27) ON CAMPUS</b>	

## GRADING:

- Homework: 25%**

There will be a total of 5 homework assignments delivered on SUCourse. Each homework assignment will be open for two weeks.

- Midterm Exam: 35%** (Ch 23-25)

- Final Exam: 40%** (Ch 26-27)

You must take both exams to pass the course.

- TopHat / Participation (Bonus): 10%**

I will be asking questions via TopHat in class. The TopHat participation (as well as worksheets in some weeks) will be counted as a participation bonus. Your cumulative TopHat % at the end of the semester plus all in-class work will be normalized to 10%. Bring your laptop to the class every week.

Your total grade is converted into letter grade using the following table as a **guideline** (decimal >0.5 will be rounded to the next integer):

100 – 85	A	69 – 65	B-	49 – 45	D+
84 – 80	A-	64 – 60	C+	44 – 40	D
79 – 75	B+	59 – 55	C	< 40	F
74 – 70	B	54 – 50	C-		

**Note: I do not "grade on curve", so what matters is YOUR own performance. Class average will NOT affect your grade.**

The course grade is calculated as follows:

**Course Grade = [Homework] + [Midterm] x 0.35 + [Final] x 0.4 + [Class Participation Bonus (TopHat 10 pts max + Stellar Evolution 1 pt)]**

### **MAKE-UP POLICY:**

There will be no make-up for missed classes or homework unless you have a long-term medical report or special circumstances that require long-term absence. In those cases, you must contact the instructor at the earliest opportunity and the situation will be evaluated case by case.

All the medical reports obtained off campus must be approved by a doctor in the SU Health Center.

If you must miss a particular exam because of health problems, you should send an email to the course instructor at your earliest opportunity within 1-2 days of the exam.

There will be a **single make-up exam** for any missed exam. The make-up exam covers **all the subjects of the course** and is typically more challenging than the regular exams. Note that **you have a chance to make up only one of the exams**, not both.

### **ACADEMIC INTEGRITY:**

In the exams and assignments, each student will be evaluated only for her/his own work. You are encouraged to work and study together with your peers, and use resources available to you; however, what you put on exam papers or assignments should be your own work in your own words. I trust that you abide by the [academic integrity statement of our University](#) throughout your academic journey.

Violations of academic integrity will result in zero grades for the assignment or exam, and a disciplinary action may follow.

What is academic integrity? See: [Academic integrity handbook for students](#) by CIAD