

General Astronomy Course Syllabus

2nd Semester, 2019

Department	Physics and Earth Science	Credits	3	Instructor	Dr. In-Ok Song	Venue	Tamgu Bldg. #2403
Lecture	General Astronomy	Class hr/1week	3	Contacts		Students ID	
				051 606 2332 song.inok@kaist.ac.kr Room #5306, Changjo Bldg.		18	

* You could visit the office anytime in working hours; however you are encouraged to give me a phone message or e-mail to set the meeting time before your visit.

* Office Hour: 14:40 ~ 15:30pm (Monday, Tuesday, Wednesday)

1. DESCRIPTION

This course involves understanding the universe which is the totality of all space, time, matter, and energy. You will be able to explain the universe in the context of the solar system, stars, galaxies and modern cosmology. Throughout the course, various measurements of distance to astronomical objects will be introduced in addition to the structure and origin of astronomical objects.

2. ORGANIZATION

It is made up of lecture, group activity and presentation. Class has sets of one-week; Day 1 for group activity, Day 2 and 3 for lectures or discussion which depends on the outcome of group activity. Group activity follows the Round-Tour-Methods (RTM) which method has been developed for creative thinking.

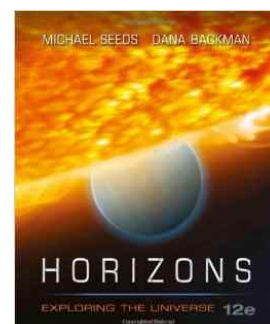
Suggestion: It is not expected to follow this syllabus exactly, but we are able to try to change it whatever you want to know together as classes going on. This syllabus will guide you, but not force your learning interests. Questions will be raised in the group activity and it can be tried to answer the questions in the next class if it is worth to do. The instructor will try to give you proper resources while you study about it as homework or collecting your own resources with friends.

3. COURSE OBJECTIVES

- To introduce you the universe and scientific methods of astronomy – observation, theory and prediction.
- To provide you opportunities to develop self-motivated study and collaborative study when one carry out group activities and local communication.
- To encourage you raising questions and dealing with it under your ability and own interests while you are in group activities.

4. TEXTBOOK and REFERENCES

- TEXTBOOK:
Horizons: Exploring the universe, 12/E, M.A. Seeds and D.E. Backman (Brooks/Cole, 2012)
- REFERENCES:
Introductory Astronomy, Keith Holliday (John Wiley & Sons, 1999)
Astronomy Today, 7/E, E. Chaisson and S. McMillan (Addison-Wesley, 2011)
An introduction to the Sun and Stars edited by S.F. Green and M.H. Jones (Cambridge University Press, 2003)



5. RESOURCES

LMS for announcement

Lectures: <https://sites.google.com/view/songio/>

6. GRADING PLAN

- a. **Paper Exams 60%** - Mid-term (30%) and final (30%) examinations
 - b. **Homework 10%** - In time you will get the score range of A to C. It will be normally three working days and the exact deadline will be announced in the classroom. If you submit your report after then and within 1 week then you will get the score range from B to D. After 1 week, any report cannot be accepted and the score is automatically F. If the report contains what is expected then the score will be B. However, if it contains anything sophisticated interests which can be thought to be more than expected then your report has the mark of A.
 - c. **eQuiz 10%** - After each RTM activities, there is on-line quiz. The number of quiz is around 30 and it is focused on the very basic concept to cover each chapter. Active anticipation on the activity and reading the book by yourself is important. Delay of submission is strictly marked less points.
 - d. **Attitude 10%** - Active participation; Cooperative in group activity; Awareness of instruction. Rubric is included at the end of the syllabus
 - e. **Attendance 10%** - Unexcused absence degrading you 2% in each time. If it is 4 times of unexcused absence, a meeting of faculty committee will be open for FAIL of the course.
- **Level of Evaluation**

More than expected	A
Expected	B
Reluctantly Followed	C/D
Fail	F

TENTATIVE SCHEDULE

	Subject	RTM topics and e-Quiz
The Sky		
Week 1	Here and Now A User's Guide to the Sky	https://www.screencast.com/t/xAJEk8sHT (Ch 1.) https://www.screencast.com/t/juVQgA6e17C (Ch 2.)
	<ul style="list-style-type: none"> Where are you in the universe? Human history fit on the timescale of the universe. How do astronomers refer to stars? How can you compare the brightness of the stars? 	
Week 2	Cycles of the Sun and Moon	https://www.screencast.com/t/dZikzybaWd (Ch3.)
	<ul style="list-style-type: none"> What causes the seasons? Why does the moon go through phases? What causes lunar and solar eclipses? Tides 	1. When is it possible of lunar phase? 2. How much big is the shadow of solar eclipse? 3. Why do tides happen?
Week 3	Origin of modern astronomy	https://www.screencast.com/t/2OwptMA2 (Ch4.)
	<ul style="list-style-type: none"> Classical astronomy Planetary motions Copernicus and Galileo Galilei Isaac Newton and orbital motion 	1. Classical astronomy; Copernicus (4-1, 4-2) 2. Planetary motion (Tycho Brache and Kepler) (4-3) 3. Galileo Galilei (4-4)
The Stars		
Week 4	Atoms and spectra	https://www.screencast.com/t/cbRaxAWxgFG (Ch6.)
	<ul style="list-style-type: none"> Atoms and starlight The interaction of light and matter Understanding spectra 	1. Atoms and starlight 2. The interaction of light and matter 3. Understanding spectra
Week 5	The Sun	https://www.screencast.com/t/gjN3PswpEh (Ch7.)
	<ul style="list-style-type: none"> The solar atmosphere Solar activity Nuclear fusion in the Sun 	1. The solar atmosphere 2. Solar activity 3. Nuclear Fusion in the Sun
Week 6	The Family of stars	https://www.screencast.com/t/12aD6eflIh5S (Ch8.)
	<ul style="list-style-type: none"> How to measure the distance to stars? How big are stars? How much energy do stars make? How much massive are stars? How can be determined the mass? 	1. Measuring the distance to stars/Intrinsic Brightness 2. Diameter of stars 3. The mass of stars/A survey of stars
Week 7	The formation and structure of stars	https://www.screencast.com/t/hqGBRdJLFrb8 (Ch9.)

	<ul style="list-style-type: none"> What is interstellar medium and how stars form from interstellar medium? How stars on the main sequence produce energy? How stars on the main sequence control the production of energy? 	<ol style="list-style-type: none"> The interstellar medium Making stars from interstellar medium (ISM) Stellar structure and nuclear fusion
Week 8	Paper examination in mid-term	
Week 9	The deaths of stars	https://www.screencast.com/t/gAJd0ZtHLV (Ch10.)
	<ul style="list-style-type: none"> What happens to a star when it uses up the last of the hydrogen in its core? What evidence show the stars really evolve? How will the Sun die? What happens if an evolving star is in a binary star system? How do massive stars die? 	<ol style="list-style-type: none"> How do lower-main-sequence stars die? What happens if an evolving star is in a binary star system? How do massive star die?
Week 10	Neutron stars and black holes	https://www.screencast.com/t/EbUM0bFDrQn (Ch11)
	<ul style="list-style-type: none"> How does the theory predict the existence of neutron stars? How do astronomers know neutron stars really exist? How does theory predict the existence of black holes? How can astronomers be sure that black holes really exist? 	<ol style="list-style-type: none"> How does the theory predict the existence of neutron stars? How do astronomers know neutron stars really exist? How does theory predict the existence of black holes? How can astronomers be sure that black holes really exist?
The Universe of Galaxies		
Week 11	The Milky Way Galaxy	
	<ul style="list-style-type: none"> The discovery of the galaxy The origin of the milky way The nucleus Spiral arms and star formation 	<ol style="list-style-type: none"> How do astronomers know what our galaxy is like? How did our galaxy form and evolve? What lies at the center of our galaxy? What are the spiral arms?
Week 12	Galaxies	
	<ul style="list-style-type: none"> The family of galaxies Measuring the properties of galaxies The evolution of galaxies 	<ol style="list-style-type: none"> What do galaxies look like? How do astronomers find the distance, size, luminosity, and mass of galaxies? Why are there different kinds of galaxies?
Week 13	Modern Cosmology	
	<ul style="list-style-type: none"> Introduction to the Universe The Big bang theory Space, time, matter and energy 21st-Century cosmology 	<ol style="list-style-type: none"> What are the big bang theory and its evidence? Which is model universe? What is accelerating universe and its evidence?

The solar system		
Week 14	The origin of the solar system	
	<ul style="list-style-type: none"> • The great chain of origins • A survey of the solar system • The story of planet building • Planets orbiting other stars 	<ol style="list-style-type: none"> 1. What is the theory for the origin of the solar system? 2. What are the observed properties of the solar system that the theory of its origin can explain? 3. What do astronomers know about other planetary system?
Week 15	The terrestrial planets	
	<ul style="list-style-type: none"> • Earth: The active planet • The Moon • Mercury/Venus/mars 	<ol style="list-style-type: none"> 1. How does distance from the sun affect the characteristics of a planet and its atmosphere? 2. How does size determine the geologic activity and evolution of a planet? 3. What is the evidence that surface conditions on Venus and Mars were originally more Earth-like than at present?
Week 16	Paper examination in final	

Rubric for Participation in Class

1. Frequency

- A. Frequency of comments is optimal (just right; neither too frequent so as to dominate, nor so little that there is no contribution). Steps in when there are silences to move discussion along but keeps quiet when this allows others to contribute. Sensitive to when to comment.
- B. Comments occasionally or a bit too much or at times that break the flow of the discussion. Sometimes talks over others.
- C. Too frequent responses: dominates discussion, not allowing students (or sometimes even teacher) to contribute or is silent or creates distractions by playing with items.

2. Relevance

- A. Contributions enhance lesson or discussion: they may ask a key question, elaborate, bring in relevant personal knowledge, move the discussion along, identify issues or take the discussion to another level. Students use the vocabulary of the topic to be precise and clear. Able to synthesize or indicate gaps or extensions to topic.
- B. Comments may only repeat what has been already said, or may be tangential or may sidetrack discussion from time to time. Language is fairly general; only personal experience has some specific details.
- C. Comments are not related to topic at hand, or go back to previous part of discussion or question. Language is so general or confused that it's difficult to understand where comment fits.

3. Growth of School community

- A. Listens actively and attentively to others prior to making own comments. Comments focus on and enhance consideration of topic rather than focusing on specific people. Comments and body language validate and encourage others' contributions. (Eye contact and nodding as culturally appropriate.)
- B. Listens intermittently as others speak, so comments are sometimes off topic or don't follow thread of discussion. Comments and body language sometimes respectful. Sometimes follows the lead of others to disrupt participation. (Eye contact made intermittently if culturally appropriate.)
- C. Comments may focus attention on self rather than on discussion. Comments may frequently interrupt others or be disrespectful. Side conversations, body language or actions, inappropriate comments or sounds may make class participation fragmented.

- **Rubric for Participation in Class** is adapted from <Teacher Planet> community

Collaboration Rubric

A - Thorough Understanding

- Consistently and actively works toward group goals.
- Is sensitive to the feelings and learning needs of all group members.
- Willingly accepts and fulfills individual role within the group.
- Consistently and actively contributes knowledge, opinions, and skills.
- Values the knowledge, opinion and skills of all group members and encourages their contribution.
- Helps group identify necessary changes and encourages group action for change.

B - Satisfactory Understanding

- Works toward group goals with occasional prompting.
- Contributes to the group with occasional prompting.
- Shows sensitivity to the feelings of others.
- Participates in needed changes, with occasional prompting.

C - Needs Improvement

- Works toward group goals only when prompted.
- Contributes to the group only when prompted.
- Needs occasional reminders to be sensitive to the feelings of others.
- Participates in needed changes when prompted and encouraged.

Collaboration rubric is adapted from <Teacher Planet> community

수업 참여도에 대한 평가 지표

학생이름:

평점:

1. 참여 빈도

- 평점 A. 참여가 적절하다 (수업을 압도할 정도로 많지도 않으며, 존재를 알아채지 못할 정도로 참여 안 하는 것도 아니다.) 주도적으로 토론에 임하며, 급우가 발언 할 때는 경청한다.
- 평점 B. 참여가 적거나 너무 많은 경우. 토론 및 협동학습의 흐름을 방해하는 경우. 급우가 발언 하는 순간에 자기도 발언하는 경우
- 평점 C. 너무 많은 발언으로 급우나 교사의 토론 및 활동을 어렵게 하는 경우. 활동이나 토론에서 침묵하는 경우.

2. 연관성

- 평점 A. 학생의 참여가 수업이나 토론을 발전시킨다. 핵심 질문을 한다거나, 급우의 질문에 해답을 제시한다거나, 자신의 지식을 공유하면서 토론의 방향을 건설적이 방향으로 이끈다. 공통 주제를 명확히 하며, 토론을 한 단계 진전시킨다. 사용하는 용어가 정확하고 명확하다.
- 평점 B. 동일한 이야기를 하기도 하며, 때때로 주제에서 벗어난 내용을 발언한다. 사용하는 용어가 특정인들만 이해할 수 있는 개인적인 경험에서 비롯된 것이다.
- 평점 C. 발언이 주제와 연관되어 있지 않다거나, 이미 끝난 이야기거나 질문에 대한 이야기를 한다. 용어가 명확하지 않고 대충 말한다거나, 이해하기 어렵게 이야기 한다.

3. 공동체 활동에 기여

- 평점 A. 자신이 발언 하기 전에 다른 학우의 이야기 경청한다. 토론할 때에 특정 학우에 대한 것이 아닌 주제에 대해 집중하고 그것을 발전시키고자 노력한다. 눈을 서로 마주친다던가 고개를 끄덕이는 등 적당한 몸짓으로 학우가 발언할 때에 용기를 분돈워 준다.
- 평점 B. 다른 학우가 이야기 할 때에 집중하지 않아서, 주제로부터 동 떨어진 이야기를 한다던가 토론의 흐름을 따라오지 않는 경우. 자신의 견해나 몸짓이 때때로 존중받을 만한 경우. 토론 주제가 아닌 학우를 공격하는 경우.
- 평점 C. 발언하는 견해가 주제가 아닌 자기 자신에 대한 이야기 인 경우. 학우의 발언에 끼어들거나 존중받지 못하는 행위. 속닥거리거나, 부적절한 견해나 소리 등으로 수업 진행에 방해 되는 경우.