

**The Hong Kong Polytechnic University**  
**Subject Description Form**

<b>Subject Code</b>	AP1D02
<b>Subject Title</b>	<b>Introduction to astronomy</b>
<b>Credit Value</b>	3
<b>Level</b>	1
<b>Pre-requisite / Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	<p>The main objectives of this subject are to introduce:</p> <p>(a) the basic astronomical phenomena by which scientists can explore the Universe;</p> <p>(b) the major concepts of the observational aspect of astronomy and our solar system;</p> <p>(c) the basic structure and dynamics of the Earth-Moon and solar system; and</p> <p>(d) different types of stars and their evolution, galaxies and cosmology.</p>
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able:</p> <p>(a) to describe the major concepts of astronomy;</p> <p>(b) to explain the basic structure and dynamics of the solar system;</p> <p>(c) to compare and contrast the structures and evolution of different types of stars; and</p> <p>(d) to use scientific and logical approaches to analyse astronomical phenomena.</p>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Basic concepts of astronomy:</b> Conventional units and terms; positional astronomy; Celestial sphere and star atlas; motions of celestial objects</p> <p><b>Basic concepts of science for astronomy:</b> Newton's Law and Kepler's Law for planetary motions; gravity; nature of light and matter; structure and operation of telescopes; Copernican Revolution</p> <p><b>Solar system:</b> Overview of the Solar System; Moon and eclipses; Earth-Moon system; Earth-Sun system; terrestrial planets; Jovian planets; solar system debris (comets, moons, rings)</p> <p><b>Stellar Evolution:</b> Definition of stars; measuring of stars; Sun, white dwarfs, neutron stars and black holes; interstellar medium</p> <p><b>Beyond the Solar System:</b> Classification of galaxies; Milky Way Galaxy; cosmic microwave background radiation; cosmological redshift; Hubble's Law; Big Bang Theory</p> <p><b>China Space Programs:</b> History &amp; Development, Shenzhou Space Program, Tiangong Program, Chang'e Program, Beidou System, QUESS – Mozi satellite</p>

**Teaching/Learning Methodology**

**Lectures:**

This subject will be taught mainly using a lecture format (about 80%). Examples of simple calculation will also be presented to assist students in understanding the basic concepts of science as well as their applications in astronomy.

**Video Lectures:**

Supplementary information of the astronomical phenomena will be presented in form of documentary. Video is an essential tool to demonstrate as well as to arouse the students' interest on the astronomical phenomena such as planetary motion, evolution of stars, supernova and big band. Post-discussions on the proposed research topics relating to the video content will be conducted to ensure their understanding and to stimulate their thinking. This can also promote interaction with students and facilitate their higher order thinking. The supporting knowledge will closely follow the pace of the lectures. The knowledge presented in the video will be assessed in project and tests.

**Individual Project:**

Study topics will be proposed to the students for in-depth exploration and discussion. This project also serves the purpose of developing the students' capability of problem solving and application of the knowledge learnt in the lecture. Latest video technologies for high-quality presentation will also be learnt from this project. Their higher order thinking, such as problem analysis, critical thinking and creative thinking, as well as creative work can be trained through the project. Peer review will be conducted after the submission of their presentation materials.

**Individual Study:**

Study effort is also devoted to reading (see the recommended reading materials). The emphasis in this subject on reading comprehension is designed to give the student an essential experience of empowerment in learning effectively.

**Reading & Assessment Feedback:** Assessments will be conducted early and often to identify students who are having difficulty, thus allowing the opportunity to intervene.

**Assessment Methods in Alignment with Intended Learning Outcomes**

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		a	b	c	d
1. Tests	40%	√	√	√	√
2. Presentation slides for project	10%	√	√	√	√
3. Video for project	50%	√	√	√	√
Total	100 %				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

There will be 2 tests and 1 project for assessing the intended learning outcomes of the students. Besides the basic knowledge of astronomy, in-depth problems will be provided in the tests and project to encourage the students to read more and think critically, and thus their high order thinking can be evaluated. Extra reading materials relating to the problems will be suggested for their self-study.

Project presentation is required at the end of the semester. Students are required to prepare slide presentations on their assigned topics and deliver that in form of video

	presentation. The presentation should include background information, reasoning and conclusions about the assigned topic. The presentation slides and video presentation will be assessed based on the clarity and depth of astronomy concepts involved, demonstration of higher order thinking (problem analysis, critical thinking and creative thinking), and the presentation skills (verbal and visual).	
<b>Student Study Effort Expected</b>	Class contact:	
	▪ Lecture + Video Lecture	39 Hrs.
	Other student study effort:	
	▪ Reading and self-study	81 Hrs.
	Total student study effort	120 Hrs.
<b>Reading List and References</b>	<p><b>Recommend for self-reading</b> : Dinah L. Moche (2009) <i>Astronomy: A Self-Teaching Guide (Wiley Self-Teaching Guides)</i> 7<sup>th</sup> Edition : John Wiley &amp; Son.</p> <p>Chaisson, Eric and Steve McMillan. (2012, 7<sup>th</sup> Ed.) <i>Astronomy - A Beginner's Guide to the Universe</i>: Prentice-Hall, Inc.</p> <p>Jeffrey O. Bennett Megan O. Donahue, Nicholas Schneider and Mark Voit (2010, 6<sup>th</sup> Ed.) <i>The Essential Cosmic Perspective</i>: Addison-Wesley</p> <p>Comins, Neil F. and William J. Kaufmann (2008) <i>Discovering the Universe</i>: W.H. Freeman</p>	