

**32. Introduction to Space Communications (PH035IU)**

Module designation	<i>This course is introductory to all fundamental aspects of Space Communications between a spacecraft (or satellites) and the ground stations. The scopes of the course cover a wide range of discussions from the satellite's technological designs and technical solutions to its communications with the controlled-ground stations. In the first part of the course, students will study the essential characteristics and components of satellites, the satellite launching methods, the satellite orbits (mainly concentrating on the geostationary satellites), and the satellite orbital perturbations; nevertheless, in the second part, the learning contents will focus on the analog and digital signals, transmissions, receptions, link equations, and satellite services.</i>
Semester(s) in which the module is taught	1, 2
Person responsible for the module	Dr. Nguyễn Ngọc Trường Minh
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 127.5 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 37.5 Private study including examination preparation, specified in hours: 90
Credit points/ECTS	3 credits/4.62 ECTS
Required and recommended prerequisites for joining the module	Previous course: General Physics 2 (PH021IU) or Physics 3 (PH015IU)



Module objectives/intended learning outcomes	Upon the successful completion of this course students will be able to:	
	Competency level	Course learning outcome (CLO)
	Knowledge	CLO1. Apply the knowledge of mathematics and physics to solve engineering problems. CLO2. Demonstrate the understanding of the fundamental principles of satellite communications, satellite orbits, and satellite designs.
	Skill	CLO3. Show abilities of expressing ideas using graphical communications or oral presentations
Attitude	CLO4. Show the role and responsibility of an engineer in society	



Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>		
	Topic	Weight	Level
	Overview of Satellite Systems	1	I
	Orbital and Launching Methods	1	I, T
	The Geostationary Orbit	1	I, T
	Polarization	1	I, T
	Introduction to Antennas	1	I, T
	Antenna Fundamental Parameters	1	I, T
	The Space and Earth Segment	1	I, T
	Analog Signals	1	I, T
	Digital Signals	1	I, T
	Error Correcting Codes	2	I, T
	Interference	1	I, T
	Satellite Network		
Direct Broadcast Satellite (DBS) Television	2	I, T	
Satellite mobile and Specialized Services			
Group Presentation	1	U	
Review 2			
Examination forms	Short-answer questions		



<p>Study and examination requirements</p>	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>
<p>Reading list</p>	<p>Textbooks:</p> <p>[1] D. Roddy, <i>Satellite Communications</i>, 4th edition, McGraw-Hill, 2006</p> <p>[2] Lecture notes</p> <p>[3] T. Prat, C. W. Bostian, <i>Satellite Communications</i>, 2nd edition, John Wiley & Sons, 2002</p> <p>References:</p> <p>[4] <i>Satellite Technology, Principles and Technology</i>, Anil K. Maini & Varsha A., Wiley, 2011.</p> <p>[5] <i>Satellite Communications Payload and System</i>, T.M. Braun, Weyley, 2012</p> <p>[6] <i>Satellite Communication Systems Engineering</i>, 2nd edition, W. L. Pritchard, H. G. Suyderhoud, R. A. Nelson, Prentice Hall, 1992</p>