47. Satellite Signal and Image Processing Laboratory (PH043IU)

Module designation	*This course provides students with experiments on transmitting the collected data from satellites to ground-based stations, then performing post-processing data on the ground. Participating students will have a chance to learn how to operate and control satellites and equip them with project management skills.*
Semester(s) in which the module is taught	1, 2
Person responsible for the module	Dr. Lê Xuân Huy
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, experiment, project.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 152.5 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): lecture: 12.5; laboratory session: 50 Private study including examination preparation, specified in hours: lecture: 30; laboratory session: 60
Credit points/ECTS	3 (1 theory + 2 practice) credits/5.54 ECTS
Required and recommended prerequisites for joining the module	Parallel course: Digital signal processing (EE092IU) Introduction to Digital Image processing (PH038IU)

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. Analyze processes of operating a satellite system, and collecting, transmitting and post-processing its data.
	Skill	CLO2. Experiment controlling components of a satellite system model and processing its data. CLO3. Show abilities of team working.
	Attitude	CLO4. Show the impact of satellite-based technological solutions in support of societal and environmental management.

Content

The description of the contents should clearly indicate the weighting of the content and the level.

Weight: lecture session (3 hours)

Teaching levels: I (Introduce); T (Teach); U (Utilize)

Part A: Theory section

Topic	**Weight**	**Level**
An introduction of satellite signal and image processing course	1	I, T
An introduction of satellite system design, verification and validation process	1	I, T
An introduction Functions Test Process	1	I, T
Function Test in practice: Electrical Power Unit, On-board computer, signal transmission	1	I, T
An introduction to system integration design process	1	I, T

Part B: Practical section

Topic	**Weight**	**Level**
Bus System Integration: Onboard Computer, Signal Transmitter and Power Supply Unit.	2	T, U
Bus System Integration: ADCS components	2	T, U
Payload System Integration	1	T, U
An introduction for system test process	1	T, U
System test in practice: ADCS: Earth pointing, Mission Scenarios planning, Payload operation: Image capture, Data transmission: S-band transmitting, Data post processing	4	T, U

Examination forms	Project.
Study and examination requirements	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. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.
Reading list	**Textbooks:** [1] *MicroSatKit Manual or equivalence satellite kit for laboratory*. **References:** [2] INCOSE Systems Engineering Handbook. *A Guide for Sy* *Life Cycle Processes and Activities*. [3] Wertz, J. R., Everett, D. F., & Puschell, J. J. (2011). *Space mission engineering: The new SMAD*. Hawthorne, CA: Micro Press. [4] *Charles D. Brown: Elements of spacecraft design*, AIAA, [5] Development of MicroDragon, *the First Vietnamese Mic Satellite*, 30th International Symposium on Space Technology and Science (ISTS), Kobe, Japan, 2015.