19. MO18-5306 Geographic Information System and Remote Sensing

Module name	Geographic Information System and Remote Sensing
Module level, if applicable	Master
Code, if applicable	MO18-5306
Subtitle, if applicable	-
Course, if applicable	Geographic Information System and Remote Sensing
Semester	3rd Semester
Person responsible for the module	Dr. Eng. M. Zikro, ST., M.Sc. Dr. Eng. Kriyo Sambodho, S.T., M.Eng.
Lecturer	Dr. Eng. M. Zikro, ST., M.Sc. Dr. Eng. Kriyo Sambodho, S.T., M.Eng.
Language	Indonesian
Relation to curriculum	Elective course for master degree program in Ocean Engineering
Type of teaching, contact hours	Lecture, <50 students 150 minutes x 16 weeks per semester
Workload	1. Class, 3 × 50' = 150 minutes per week 2. Independent Study, 3 × 60' = 180 minutes per week 3. Structured Activities, 3 × 60' = 180 minutes per week
Credit points	3 CREDITS ~ 4.8 ECTS CREDITS × 1.6 ECTS
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.
Recommended prerequisites	-

Learning outcomes **and their corresponding PLOs**	CLO.1. Students can explain the physics and system of Remote Sensing CLO.2. Students can explain the priciples of Map Projection CLO.3. Students can explain technique to obtain data and analysis of RADAR and LIDAR data CLO.4. Students can analyze simple data using opensource software (MultiSpec dan GRASS) CLO.5. Students can combine GIS technique and Remote Sensing to solve simple problems in coastal management and coastal hazard management	LO.8. Able to identify, formulize and solved the science and technology problems related to ocean engineering through the accurate and innovative theoretical, experimental, or computational approach

Content	This course introduces cartographic knowledge of map projections and the principles of remote sensing to students in this field. Where this course provides an understanding of physics from remote sensing, Aerial Engineering Photographic, photogrametry, multispectral, hyperspectral and thermal imaging. As well as introducing RADAR and LIDAR image processing technology coupled with providing an introduction to map scale, coordinate system and accuracy of mapping, introduction and identification of geographical data: position, attributes, spatial relationships, data retrieving, data manipulation, analysis and display of spatially-referenced data. In this lecture students are also given an understanding of the application of GIS and remote sensing especially for coastal area management and disaster management. Students will get the following subjects: ▪ Remote Sensing as Technology and Its Histories ▪ Physical Properties, interaction, measumenets and Reflector target anaysis ▪ Equipments in Remote Sensing, , aerial photography and processes ▪ Elements of visual interpretation, multispectral and hyperspectral systems ▪ Principles of thermal radiation and thermal imaging ▪ RADAR transmission characteristics, passive image microwave sensing/ LIDAR interpretation ▪ Remote Sensing for vegetation, water, soil and geomorphology, introduction to MultiSpec ▪ Introduction to GIS, GIS component, GRASS Introduction ▪ GRASS Project and Discussion ▪ GIS Model data: Vector model and Raster Model ▪ GIS Model data: Vector vs Raster Model ▪ Spatial Data Analysis ▪ Spatial Data Analysis and Analytical Model in GIS ▪ Future of GIS, GIS for coastal management and coastal hazard management
Study and examination requirements and forms of examination	20. In-class exercise 21. Assignment 22. Mid-term exam 23. Final exam
Media employed	Offline: LCD, whiteboard, PowerPoint presentation Online: websites (myITS Classroom), Zoom, Microsoft Teams, PowerPoint presentation

Reading list	1. Jensen, John, R., 2000, Remote Sensing of the Environment: An Earth Resources Perspective, New jersey: Prentice Hall, ISBN: 0-13-489733-1 2. Neteler, M and Mitasova, H., 2005, Neteler, M and Mitasova, H., 2005, OPEN SOURCE GIS: A GRASS GIS APPROACH Second Edition, Kluwer Academic Publishers 3. Shamsi, U.M., 2005, GIS applications for water, wastewater, and stormwater systems, Taylor and Francis, London 4. MULTISPEC, https://engineering.purdue.edu/~biehl/MultiSpec/ 5. GRASS (Geographic Resources Analysis Support System), http://grass.fbk.eu/ 6. John A. Richards and Xiuping Jia, Remote Sensing Digital Image Analysis 7. GIS for sustainable development, edited by Michele Campagna 8. GIS for coastal zone management, edited by Darius J. Bartlett and Jennifer L. Smith 9. Environmental Modelling with GIs and Remote Sensing, edited by Andrew Skidmore