PROGRAM STUDI MAGISTER TEKNIK GEOMATIKA
MASTER OF GEOMATICS ENGINEERING

BUKU PEDOMAN MATA KULIAH

COURSES MODULE HANDBOOK

PENGOLAHAN CITRA RESOLUSI TINGGI
HIGH RESOLUTION IMAGE PROCESSING

DEPARTEMEN TEKNIK GEOMATIKA
Fakultas Teknik Sipil, Perencanaan, dan Kebumian

DEPARTMENT OF GEOMATICS ENGINEERING
Faculty of Civil Engineering, Planning, and Geo Engineering

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

17. Pengolahan Citra Resolusi Tinggi / *High Resolution Image Processing*

Nama modul *Module name*	**Pengolahan Citra Resolusi Tinggi** *High Resolution Image Processing*
Tingkatan *Module level*	Pasca Sarjana (S2) *Master Degree*
Kode *Code*	CM235704
Mata kuliah *Course*	Pengolahan Citra Resolusi Tinggi *High Resolution Image Processing*
Semester *Semester*	III (tiga) atau IV (empat) *III (three) or IV (four)*
Penanggung jawab mata kuliah *Person responsible for the module*	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS
Dosen *Lecturer*	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D.
Bahasa *Language*	Bahasa Indonesia dan Bahasa Inggris *Indonesian and English*
Relasi pada kurikulum *Relation to curriculum*	Mata kuliah pilihan untuk Program Master Teknik Geomatika *Elective Courses for Master of Geomatics Engineering*
Tipe pertemuan, jam tatap muka *Type of teaching, contact hours*	Kuliah, 1.67 jam x 16 minggu per semester *Lecture, 1.67 hours x 16 weeks per semester*
Beban belajar *Workload*	Kuliah: 1.67 jam x 14 minggu = 23.38 jam Penugasan terstruktur: 2 jam x 14 minggu= 28 jam Kegiatan mandiri: 2 jam x 14 minggu = 28 jam Ujian: 1.67 jam x 2 kali = 3.34 jam Paper review: 2.83 jam x 14 = 39.62 Studi Case-based: 2.83 jam x 14 = 39.62 Total = 161.96 jam *Lecture: 1.67 hours x 14 weeks = 23.38 hours* *Structured exercises and assignments: 2 hours x 14 weeks = 28 hours* *Independent activities: 2 hours x 14 weeks = 28 hours* *Exam: 1.67 hours x 2 time = 3.34 hours* *Paper review: 2.83 jam x 14 = 39.62* *Case-based study: 2.83 jam x 14 = 39.62* *Total = 161.96 hours*
Kredit *Credits*	2 SKS + 2 SKS tambahan beban *2 credits + 2 credits additional activities*
Persyaratan sesuai dengan peraturan ujian *Requirements according to theexamination regulations*	Minimum 80% kehadiran untuk mengikuti ujian tertulis *Minimum 80% attendance in this course in order to take the exams*

Deskripsi Mata Kuliah	Pada mata kuliah ini mahasiswa akan mempelajari tentang teori dasar satelit yang terdiri dari sejarah platform, prinsip dasar, fisika gelombang elektromagnetik, transport carrier, dan geometri satelit. Materi terkait satelit resolusi tinggi akan dibahas seluruhnya dalam sesi kuliah dan diskusi, yang berisi tentang jenis dan spesifikasi citra, definisi penginderaan jauh, dan karakter reflektan pada objek. Selain itu, mahasiswa juga mempelajari lebih lanjut tentang interpretasi penginderaan jauh dan peralatan dasar untuk pengolahan citra yang terdiri dari perhitungan dan interpretasi citra satelit. Tujuan akhir dari kuliah ini adalah mahasiswa mampu melakukan pemrosesan citra untuk mendapatkan peta dasar skala besar. Capaian pembelajaran dipenuhi melalui kuliah, eksperimen, dan penugasan. Hasil eksperimen dan analisis akan disajikan secara tertulis dan presentasi secara mandiri maupun bekerja bersama-sama dalam tim.
Description of Course	*Students will study the basic theory of satellites in this course, which includes the history of the platform, basic concepts, physics of electromagnetic waves, transport carriers, and satellite geometry. Materials relating to high-resolution satellites will be thoroughly explored in lecture and discussion sessions, including types and specifications of images, remote sensing definitions, and object reflectance characteristics. In addition, students learn more about remote sensing interpretation and fundamental image processing equipment, which includes calculating and analyzing satellite pictures. The ultimate objective of this course is for students to be able to perform image processing in order to produce large-scale base maps. Lectures, experiments, and assignments are used to achieve learning objectives. The findings of experiments and analyses will be reported in writing and in presentations, either individually or collaboratively.*
Capaian Pembelajaran / *Course Learning Outcomes*	1. Mampu memahami konsep dasar platform, prinsip dasar, fisika gelombang elektromagnetik, media propagasi, dan geometris satelit. 2. Mampu memahami konsep, metode, proses, alat, dan data dalam interpretasi penginderaan jauh analog dan digital dan selanjutnya melakukan interpretasi tersebut sesuai dengan pemahamannya. 3. Mampu memahami pengolahan citra untuk menghitung dan menginterpretasikan citra satelit.

Module objectives/ Course learning outcomes	4. Mampu memahami kegiatan informasi geospasial metode penginderaan jauh.
	1. Able to understand the basic concept of the platform, the basic principles, physics of electromagnetic waves, propagation media, and the geometrics of satellites.
	2. Able to understand the concept, the methods, the process, the tools, and the data in the interpretation of analog and digital remote sensing and further conduct such interpretation according to their understanding.
	3. Able to understand image processing for calculating and interpreting satellite imagery.
	4. Able to understand geospatial information activities of remote sensing methods.

CPMK dan hubungan dengan CPL Prodi
Learning outcomes and their corresponding to PLOs

	PLO.1	PLO.2	PLO.3	PLO.4	PLO.5	PLO.6	PLO.7	PLO.8	PLO.9
CLO.1									✓
CLO.2				✓					
CLO.3				✓					✓
CLO.4									✓

Mata kuliah wajib prasyarat *Mandatory prerequisites*	-
Pokok Bahasan	1. Konsep dasar platform sejarah, prinsip dasar, fisika gelombang elektromagnetik, wahana pengangkut, satelit geometris. Jenis dan spesifikasi citra, pengertian citra satelit penginderaan jauh resolusi tinggi, karakter reflektan pada objek di permukaan bumi. interpretasi penginderaan jauh analog: definisi dasar, interpretasi dasar, interpretasi kunci, jenis, metode, proses, alat, interpretasi data/dokumen. interpretasi penginderaan jauh (digital).
	2. Peralatan dasar penginderaan jauh (pengolah citra) untuk menghitung dan menginterpretasikan citra satelit. Kegiatan informasi geospasial metode penginderaan jauh dengan membuat job requirements dan membuat orbit satelit.
	3. Melaporkan hasil eksperimen dan hasil analisis secara tertulis dan lisan dengan bekerja secara mandiri dan bersama-sama dalam tim.
Content	*1. Basic concepts of historical platform, basic principles, physics of electromagnetic waves, rides of transporters, geometric satellites. Image types and*

	specifications, understanding remote sensing satellite high-resolution image, reflectant character on objects on earth's surface. interpretation of analog remote sensing: basic definition, basic interpretation, key interpretation, types, methods, processes, tools, data /document interpretation. remote sensing interpretation (digital). 2. *Remote sensing basic equipment (image processing) to calculate and interpret satellite imagery. The geospatial information activities of remote sensing methods by making job requirements and making satellite orbit.* 3. *Reporting experimental results and analytical results in writing and orally by working independently and together in teams.*
Pembelajaran dan Persyaratan Ujian *Study and examination requirements and forms of examination*	<table><tr><th>Rencana Evaluasi</th><th>Bobot *Weight*</th></tr><tr><td>Kognitif - Tugas Cognitive - Assigment</td><td>20%</td></tr><tr><td>Hasil proyek Team - based Project</td><td>20%</td></tr><tr><td>Kognitif - UTS Caognitive - Midterm Exam</td><td>30%</td></tr><tr><td>Kognitif - UAS Cognitive - Final Exam</td><td>30%</td></tr></table>
Media yang digunakan *Media employed*	Classical teaching tools with white board and powerpoint presentation
Daftar Pustaka *Reading list*	1. Dowman, I., Jacobsen, K., Konecny, G., and Sandau, R., High Resolution Optical Satellite Imagery, 2nd edition, Whittle Publishing, 2022Shrestha, D.P., Remote Sensing Techniques And Digital Image Processing, International Institute for Aerospace Survey and Earth Sciences, 1994 2. Coleman, Diane, and Tennant, Keith, Intermap's Significant Upgrade Investments takes Radar Upscale into finer resolution territory, Intermap Article, September 2002 3. Gonzales, R.C. and Woods, R., Digital Image Processing 4th Edition, Pearson, USA, 2019 4. Jhon RJ and Jensen, Introduction Digital Image Processing, A Remote Sensing Perspective, USA,1996 5. Jonathan Williams, Geographic Information From Space, Processing and Applications of Geocoded Satellite Images, Wiley-Praxis Series in Remote Sensing, Chichester, 1995.