

PROGRAM STUDI MAGISTER TEKNIK GEOMATIKA
MASTER OF GEOMATICS ENGINEERING



BUKU PEDOMAN MATA KULIAH
COURSES MODULE HANDBOOK

DEPARTEMEN TEKNIK GEOMATIKA
Fakultas Teknik Sipil, Perencanaan, dan Kebumihan

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

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

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PENDAHULUAN (PREFACE)

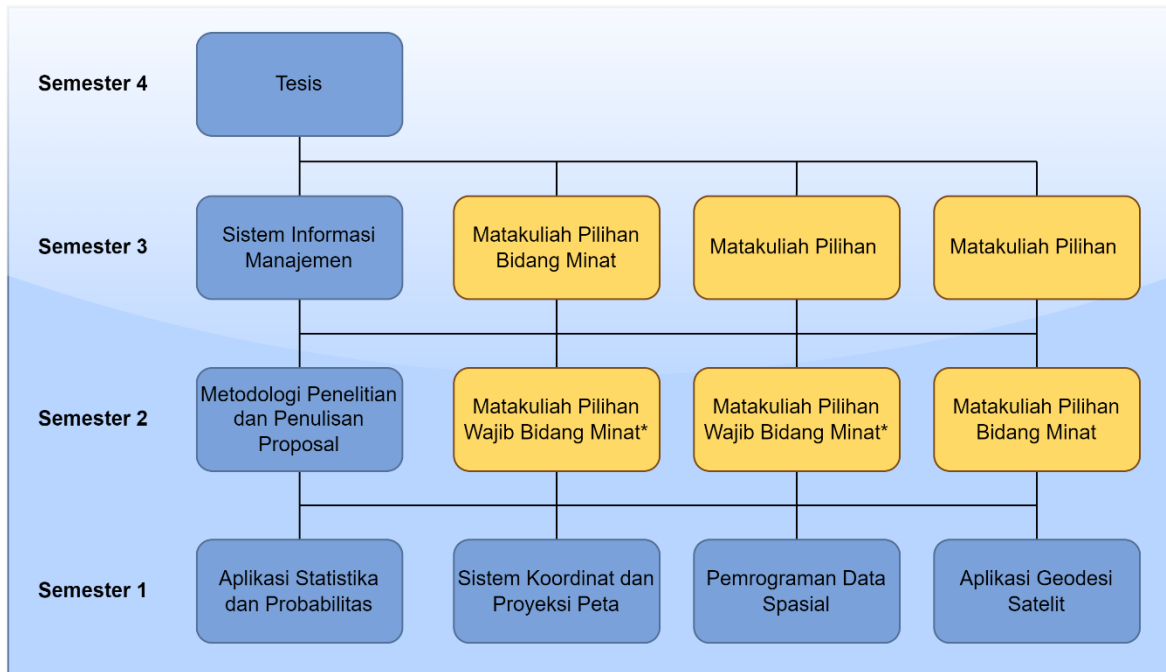
Capaian Pembelajaran Lulusan (*Program Learning Outcomes*)

Kode Code	Capaian Pembelajaran (CPL) <i>Program Learning Outcomes (PLO)</i>
CPL-01	Mampu menunjukkan sikap dan karakter yang mencerminkan: ketakwaan kepada Tuhan Yang Maha Esa, etika dan integritas, berbudi pekerti luhur, peka dan peduli terhadap masalah sosial dan lingkungan, menghargai perbedaan budaya dan kemajemukan, menjunjung tinggi penegakan hukum, mendahulukan kepentingan bangsa dan masyarakat luas, melalui kreatifitas dan inovasi, eksekusi, kepemimpinan yang kuat, sinergi, dan potensi lain yang dimiliki untuk mencapai hasil yang maksimal.
<i>PLO-01</i>	<i>Able to demonstrate attitudes and characters that reflects : being pious to God Almighty, having ethics and integrity, virtuous character, sensitive and concerned with social and environmental issues, respecting cultural differences and pluralism, upholding law enforcement, prioritizing the interests of the nation and the wider community, through creativity and innovation, excellence, strong leadership, synergy, and other potentials to achieve maximum results.</i>
CPL-02	Mampu mengembangkan dan memecahkan permasalahan ilmu pengetahuan dan teknologi dalam bidang teknik geomatika melalui riset dengan pendekatan inter atau multidisiplin hingga menghasilkan karya inovatif dan teruji dalam bentuk tesis dan makalah yang telah diterima di jurnal ilmiah nasional terakreditasi atau diterima di seminar internasional bereputasi.
<i>PLO-02</i>	<i>Able to develop and solve science and technology problems in the field of geomatics engineering through research with an inter or multidisciplinary approach to produce innovative and tested works in the form of theses and papers that have been accepted in accredited national journals or accepted at reputable international seminars</i>
CPL-03	Mampu mengelola pembelajaran diri sendiri, dan mengembangkan diri sebagai pribadi pembelajar sepanjang hayat untuk bersaing di tingkat nasional, maupun internasional, dalam rangka berkontribusi nyata untuk menyelesaikan masalah dengan mengimplementasikan teknologi informasi dan komunikasi dan memperhatikan prinsip keberlanjutan.
<i>PLO-03</i>	<i>Able to manage their own learning and develop themselves as personal lifelong learners to compete at national and international levels, in order to make a real contribution to solving problems by implementing information and communication technology and paying attention to the principle of sustainability.</i>
CPL-04	Memiliki pengetahuan mendalam dan spesifik tentang metode matematika dan statistik, dan mampu menguasai, mengembangkan dan memanfaatkan model evaluasi yang kompleks dan terkini yang berkaitan dengan semua bidang teknik geomatika: geodesi & geodinamika; surveying & kadaster; GIS, penginderaan jauh, & fotogrametri; dan hidrografi & kelautan.
<i>PLO-04</i>	<i>Having in-depth and specific knowledge of mathematical and statistical methods, and able to master, develop and utilize complex and up-to-date evaluation models related to all areas of geomatics engineering: geodesy & geodynamics; surveying & cadastre; GIS, remote sensing, & photogrammetry; and hydrographic & marine.</i>
CPL-05	Mampu mengembangkan dan menerapkan ilmu dan teknologi kebumih dengan pendekatan interdisiplin dan multidisiplin yang mengintegrasikan hasil penelitian di bidang teknik geomatika: geodesi & geodinamika; surveying & kadaster; GIS, penginderaan jauh, & fotogrametri; dan hidrografi & kelautan.

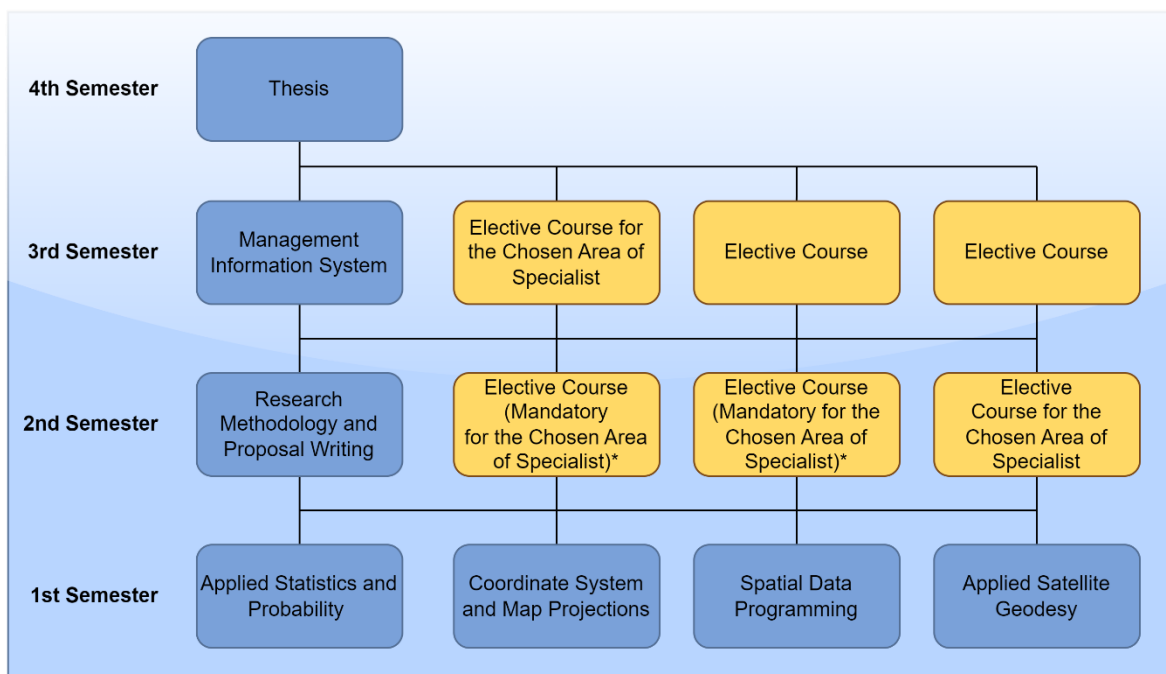
Kode Code	Capaian Pembelajaran (CPL) Program Learning Outcomes (PLO)
PLO-05	<i>Able to develop and apply earth science and technology with an interdisciplinary and multidisciplinary approach that integrates research results in the field of geomatics engineering: geodesy & geodynamics; surveying & cadastre; GIS, remote sensing, & photogrammetry; and hydrographic & marine.</i>
CPL-06 PLO-06	Mampu mengidentifikasi, menganalisis, mengembangkan dan menyediakan penggunaan alternatif ilmu dan teknologi dalam bidang teknik geomatika: geodesi & geodinamika; surveying & kadaster; GIS, penginderaan jauh, & fotogrametri; dan hidrografi & kelautan untuk mendukung pembangunan di era informasi dan globalisasi. <i>Able to identify, analyze, develop and provide alternative uses of science and technology in the field of geomatics engineering: geodesy & geodynamics; surveying & cadastre; GIS, remote sensing, & photogrammetry; and hydrographic & marine to support development in the information and globalization era.</i>
CPL-07 PLO-07	Mampu melakukan, mengembangkan, dan mengelola penelitian dan metode inovatif di bidang teknik geomatika yang ditujukan untuk pengembangan ilmu pengetahuan yang dapat diterapkan dan dimanfaatkan oleh masyarakat. <i>Able to conduct, develop, and manage innovative research and methods in the field of geomatics engineering aimed at the development of science that can be applied and utilized by the community.</i>
CPL-08 PLO-08	Mampu mengembangkan dan mengaplikasikan sistem manajemen kualitas berbasis riset di bidang teknik geomatika untuk mengevaluasi pekerjaan dengan mempertimbangkan aspek legal dan kondisi sosio-ekonomi. <i>Able to develop and apply a research-based quality management system in the field of geomatics engineering to evaluate work by considering legal aspects and socio-economic conditions.</i>
CPL-09 PLO-09	Mampu mengelola, mengembangkan dan memelihara jaringan dengan rekan kerja, rekan-rekan dalam lembaga yang lebih luas dan komunitas penelitian. <i>Able to manage, develop and maintain networks with colleagues, peers within wider institutions and research communities.</i>

Struktur Mata Kuliah (*Course Structure*)

Peta Kurikulum Magister Teknik Geomatika



Curriculum map of Master of Geomatics Engineering



Struktur Kurikulum / Course Structure

No	Kode Code	Nama Mata Kuliah Course Name	sks credits
SEMESTER I			
1	CM235101	Aplikasi Statistika dan Probabilitas <i>Applied Statistics and Probability</i>	3
2	CM235102	Sistem Koordinat dan Proyeksi Peta <i>Coordinate System and Map Projections</i>	2
3	CM235103	Pemrograman Data Spasial <i>Spatial Data Programming</i>	3
4	CM235104	Aplikasi Geodesi Satelit <i>Applied Satellite Geodesy</i>	2
SEMESTER II			
1	CM235201	Metodologi Penelitian dan Penulisan Proposal <i>Research Methodology and Proposal Writing</i>	2
2	CM235xxx	Matakuliah Pilihan Wajib Bidang Minat* <i>Elective Course (Mandatory for the Chosen Area of Specialist)</i>	3
3	CM235xxx	Matakuliah Pilihan Wajib Bidang Minat* <i>Elective Course (Mandatory for the Chosen Area of Specialist)</i>	3
4	CM235xxx	Matakuliah Pilihan Bidang Minat <i>Elective Course for the Chosen Area of Specialist</i>	2
SEMESTER III			
1	CM235xxx	Sistem Informasi Manajemen <i>Management Information System</i>	2
2	CM235xxx	Matakuliah Pilihan Bidang Minat <i>Elective Course for the Chosen Area of Specialist</i>	2
3	CM235xxx	Matakuliah Pilihan <i>Elective Course</i>	2
4	CM235xxx	Matakuliah Pilihan <i>Elective Course</i>	2
SEMESTER IV			
1	CM235401	Tesis <i>Thesis</i>	8
<i>Total Credits</i>			36

Daftar Mata Kuliah Pilihan / List of Elective Courses

No	Kode Code	Nama Mata Kuliah Course Name	sks credits
1	CM235501	Analisis Data Sistem Penentuan Posisi Global* <i>Global Navigation Satellite System Data Analysis</i>	3
2	CM235502	Pemodelan Deformasi dan Geodinamika* <i>Deformation and Geodynamics Modelling</i>	3
3	CM235503	Pemodelan Gayaberat Bumi <i>Earth's Gravity Modelling</i>	2
4	CM235504	Mitigasi Bencana <i>Disaster Mitigation</i>	2
5	CM235505	GNSS Atmosfir <i>Atmospheric GNSS</i>	2

No	Kode Code	Nama Mata Kuliah Course Name	sks credits
6	CM235506	Satelit Altimetri Lanjut <i>Advanced Satellite Altimetry</i>	2
7	CM235507	Global Geodetic Observing System <i>Global Geodetic Observing System</i>	2
8	CM235601	Survei Rekayasa Lanjut* <i>Advanced Engineering Survey</i>	3
9	CM235602	Administrasi Pertanahan Lanjut* <i>Advanced Land Administration</i>	3
10	CM235603	Penilaian Tanah <i>Land Appraisal</i>	2
11	CM235604	Sistem Informasi Pertanahan Lanjut <i>Advanced Land Information System</i>	2
12	CM235605	3D Kadaster dan BIM <i>3D Cadastre and BIM</i>	2
13	CM235606	Pemetaan Bawah Tanah <i>Underground Survey</i>	2
14	CM235701	Sistem Informasi Geografis Lanjut* <i>Advanced Geographic Information Systems</i>	3
15	CM235702	Analisis Citra Satelit Penginderaan Jauh* <i>Remote Sensing Satellite Imagery Analysis</i>	3
16	CM235703	Fotogrametri Lanjut <i>Advanced Photogrammetry</i>	3
17	CM235704	Pengolahan Citra Resolusi Tinggi <i>High Resolution Image Processing</i>	2
18	CM235705	Sosio Ekonomi Spasial <i>Spatial Socio-Economic</i>	2
19	CM235706	Perencanaan Wilayah <i>Urban and Regional Planning</i>	2
20	CM235707	Kartografi dan Geovisualisasi <i>Cartography and Geovisualization</i>	2
21	CM235708	Pengelolaan Infrastruktur Informasi Geospasial <i>Geospatial Information Infrastructure Management</i>	2
22	CM235709	Penginderaan Jauh Sistem Aktif <i>Active System Remote Sensing</i>	2
23	CM235710	3D Model <i>3D Model</i>	2
24	CM235801	Rekayasa Survei Hidrografi* <i>Applied Hydrographic Survey</i>	3
25	CM235802	Analisis Data Hidro-Oseanografi* <i>Hydro-Oceanography Data Analysis</i>	3
26	CM235803	Oseanografi Fisik Lanjut <i>Advanced Physical Oceanography</i>	2
27	CM235804	Aspek Geodetik dalam Hukum Laut <i>Geodetic Aspects of the Law of the Sea</i>	2
28	CM235805	Kadaster Laut Lanjut <i>Advanced Marine Cadastre</i>	2
29	CM235806	Pengelolaan Wilayah Pesisir dan Laut Lanjut <i>Advanced Coastal Zone and Marine Management</i>	2

Daftar Mata Kuliah Pilihan Berdasarkan Bidang Minat

Geodesi dan Geodinamika	Surveying dan Kadaster	SIG, Penginderaan Jauh dan Fotogrametri	Hidrografi & Kelautan
Analisis Data Sistem Penentuan Posisi Global*	Survei Rekayasa Lanjut*	Sistem Informasi Geografis Lanjut*	Rekayasa Survei Hidrografi*
Pemodelan Deformasi dan Geodinamika*	Administrasi Pertanahan Lanjut*	Analisis Citra Satelit Penginderaan Jauh*	Analisis Data Hidro-Oseanografi*
Pemodelan Gayaberat Bumi	Penilaian Tanah	Fotogrametri Lanjut	Oseanografi Fisik Lanjut
Mitigasi Bencana	Sistem Informasi Pertanahan Lanjut	Pengolahan Citra Resolusi Tinggi	Aspek Geodetik dalam Hukum Laut
GNSS Atmosfir	3D Kadaster dan BIM	Sosio Ekonomi Spasial	Kadaster Laut Lanjut
Satelit Altimetri Lanjut	Pemetaan Bawah Tanah	Perencanaan Wilayah	Pengelolaan Wilayah Pesisir dan Laut Lanjut
Global Geodetic Observing System		Kartografi dan Geovisualisasi	
		Pengelolaan Infrastruktur Informasi Geospasial	
		Penginderaan Jauh Sistem Aktif	
		3D Model	

List of elective courses based on four areas of specialist

<i>Geodesy and Geodynamics</i>	<i>Surveying and Cadastre</i>	<i>GIS, Remote Sensing, and Photogrammetry</i>	<i>Hydrography and Marine</i>
<i>Global Navigation Satellite System Data Analysis*</i>	<i>Advanced Engineering Survey*</i>	<i>Advanced Geographic Information Systems*</i>	<i>Applied Hydrographic Survey*</i>
<i>Deformation and Geodynamics Modelling*</i>	<i>Advanced Land Administration*</i>	<i>Remote Sensing Satellite Imagery Analysis*</i>	<i>Hydro-Oceanography Data Analysis*</i>
<i>Earth's Gravity Modelling</i>	<i>Land Appraisal</i>	<i>Advanced Photogrammetry</i>	<i>Advanced Physical Oceanography</i>
<i>Disaster Mitigation</i>	<i>Advanced Land Information System</i>	<i>High Resolution Image Processing</i>	<i>Geodetic Aspects of the Law of the Sea</i>
<i>Atmospheric GNSS</i>	<i>3D Cadastre and BIM</i>	<i>Spatial Socio-Economic</i>	<i>Advanced Marine Cadastre</i>
<i>Advanced Satellite Altimetry</i>	<i>Underground Survey</i>	<i>Urban and Regional Planning</i>	<i>Advanced Coastal Zone and Marine Management</i>
<i>Global Geodetic Observing System</i>		<i>Cartography and Geovisualization</i>	
		<i>Geospatial Information Infrastructure Management</i>	
		<i>Active System Remote Sensing</i>	
		<i>3D Model</i>	

Matriks CPL – Mata Kuliah (*PLO – Courses Matrix*)

CPL PLO	Semester 1				Semester 2				Semester 3				Semester 4
	Aplikasi Statistika dan Probabilitas/ <i>Applied Statistics and Probability</i>	Sistem Koordinat dan Proyeksi Peta / Coordinate System and Map Projections	Pemrograman Data Spasial / Spatial Data Programming	Aplikasi Geodesi Satelit / Applied Satellite Geodesy	Metodologi Penelitian dan Penulisan Proposal / Research Methodology and Proposal Writing	Matakuliah Pilihan Wajib Bidang Minat / Elective Course (Mandatory for the Chosen Area of Specialist)	Matakuliah Pilihan Wajib Bidang Minat / Elective Course (Mandatory for the Chosen Area of Specialist)	Matakuliah Pilihan Bidang Minat / Elective Course for the Chosen Area of Specialist	Sistem Informasi Manajemen / Management Information System	Matakuliah Pilihan Bidang Minat / Elective Course for the Chosen Area of Specialist	Matakuliah Pilihan / Elective Course	Matakuliah Pilihan / Elective Course	Tesis / Thesis
CPL-01 PLO-01			✓										
CPL-02 PLO-02					✓								✓
CPL-03 PLO-03					✓				✓				
CPL-04 PLO-04	✓	✓	✓	✓					✓				
CPL-05 PLO-05		✓		✓					✓				✓
CPL-06 PLO-06	✓	✓		✓					✓				
CPL-07 PLO-07			✓		✓								✓
CPL-08 PLO-08	✓								✓				✓
CPL-09 PLO-09									✓				✓

	<p>4. <i>Able to perform time-series analysis for problems in the field of geomatics.</i></p> <p>5. <i>Able to apply statistical methods for spatial-temporal data analysis in problems in the field of geomatics.</i></p>																																																												
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <th>CLO.4</th> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.5</th> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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				✓		✓				CLO.5				✓		✓			
	PLO.1	PLO.2	PLO.3	PLO.4	PLO.5	PLO.6	PLO.7	PLO.8	PLO.9																																																				
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CLO.4				✓		✓																																																							
CLO.5				✓		✓																																																							
<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	-																																																												
<p>Pokok Bahasan <i>Content</i></p>	<p>Data Statistik, Distribusi Frekuensi, Ukuran Nilai Pusat, Regresi linier dan multivariable, Korelasi dan kovariansi, Aplikasi pengolahan data dan penyajian data metode analisa geostatistical (SIG), Aplikasi pengolahan data uji ketelitian citra satelit (Penginderaan Jauh), Probabilitas, Distribusi Normal, Disribusi t-student dan chi-square, Interval kepercayaan, Estimasi rata-rata dan variansi, Uji Statistik rata-rata dan variansi, Aplikasi pengujian data untuk SIG dan Penginderaan Jauh.</p> <p><i>Statistical Data, Frequency Distribution, Central Values Size, Linear Regression and Multivariable, Correlation and Covariance, Data processing application and data presentation of geostatistical analysis method (GIS), Satellite Imagery Satisfaction Test, Satisfaction Probability, Normal Distribution, Distribution t-student and chi-square, Confidence interval, Average estimation and variance, Average statistical and variance test, Data testing application for GIS and Remote Sensing.</i></p>																																																												
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas dan presentasi 1 <i>Assignments and presentation 1</i></td> <td>15%</td> </tr> <tr> <td>Tugas dan presentasi 2 <i>Assignments and presentation 2</i></td> <td>15%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td>20%</td> </tr> <tr> <td>Tugas dan presentasi 3 <i>Assignment and presentation 3</i></td> <td>15%</td> </tr> <tr> <td>Tugas dan presentasi 4 <i>Assignment and presentation 4</i></td> <td>15%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas dan presentasi 1 <i>Assignments and presentation 1</i>	15%	Tugas dan presentasi 2 <i>Assignments and presentation 2</i>	15%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	20%	Tugas dan presentasi 3 <i>Assignment and presentation 3</i>	15%	Tugas dan presentasi 4 <i>Assignment and presentation 4</i>	15%																																																
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	Evaluasi Akhir Semester <i>Final Semester Exam</i>	20%
Media yang digunakan <i>Media employed</i>	Classical teaching tools with white board and power point presentation	
Daftar Pustaka <i>Reading list</i>	<ol style="list-style-type: none"> 1. Johnson, R.A. and Bhattacharyya, G.K. 2010. Statistics Principles and Methods 6th Ed. 2. John Wiley & Sons. Mikhail,E.M., 1976. Analysis and Adjustment of Survey Measurements. Dun Donnelley Publisher New York. 3. Ghilani, C. and Wolf, P.R. 2006. Adjustment Computations: Spatial Data Analysis 4th Ed. 4. John Wiley & Sons. Heigerger, R.M. and B. Holland. 2009. Statistical Analysis and Data Display. 5. Springer Hengl, T. 2009. A Practical Guide to Geostatistical Mapping. Office for Official Publications of the European Communities, Luxembourg. 	

2. Sistem Koordinat dan Proyeksi Peta / *Coordinate Systems and Map Projections*

Nama modul <i>Module name</i>	Sistem Koordinat dan Proyeksi Peta <i>Coordinate Systems and Map Projections</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235102
Mata kuliah <i>Course</i>	Sistem Koordinat dan Proyeksi Peta <i>Coordinate Systems and Map Projections</i>
Semester <i>Semester</i>	I (satu) <i>I (one)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D.
Dosen <i>Lecturer</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah wajib untuk Program Master Teknik Geomatika <i>Compulsory Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 Total = 82.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 28 hours</i> <i>Independent activities: 4 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 82.72 hours</i>
Kredit <i>Credits</i>	2 SKS <i>2 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Pada mata kuliah ini mahasiswa mempelajari konsep-konsep umum: konsep dasar (elipsoida referensi, ellipsoida geometri, sistem koordinat, pemecahan masalah geodesi (metode langsung dan direct invers problem) oleh Legendre dan Gauss, proyeksi peta (berbagai transformasi koordinat, jenis proyeksi, definisi faktor skala) , transformasi sudut pada proyeksi konform, konvergensi meridian, metode perhitungan sistem proyeksi oleh Polieder, Mercator, Transverse Mercator dan Universal Transverse Mercator, Transformasi Koordinat Geodesi ke Proyeksi Polieder dan sebaliknya, Transformasi Koordinat Proyeksi Geodesi ke Mercator dan sebaliknya, Transformasi Geodesi Koordinat ke Proyeksi UTM dan sebaliknya, Transformasi Koordinat Polieder ke Mercator dan sebaliknya</p> <p><i>In this course students learn about general concepts: basic concepts (reference ellipsoids, geometric ellipsoids, coordinate system, problem solving geodesy (direct method and direct inverse problem) by Legendre and Gauss, map projection (various coordinate transformation, projection type, scale factor definition, angle transformation on conformational projection, meridian convergence, calculation method of projection system by Polieder, Mercator, Transverse Mercator and Universal Transverse Mercator, Transformation of Geodesy Coordinate to Polieder Projection and vice versa, Coordinate Transformation Geodesy to Mercator Projection and vice versa, Transforming Geodesy Coordinate to UTM Projection and vice versa, Transforming Coordinate Polieder to Mercator and vice versa.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mampu menelaskan dan mengidentifikasi konsep geometri dan macam-macam proyeksi. 2. Mampu mengaplikasikan transformasi koordinat dalam pemetaan dan konsep dasar untuk menyelesaikan persoalan proyeksi peta dalam geodesi. 3. Mampu melaporkan hasil percobaan dan hasil analisis secara tertulis dan lisan, bekerja mandiri dan bekerja sama dalam tim. <p><i>1. Able to explain and identify geometric concepts and various types of projections.</i></p>

	<p>2. <i>Able to apply coordinate transformations in mapping and basic concepts to solve map projection problems in geodesy.</i></p> <p>3. <i>Able to report experimental results and analysis results in writing and orally, work independently and collaborate in a team.</i></p>																																								
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 506 1283 696"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PLO.1	PLO.2	PLO.3	PLO.4	PLO.5	PLO.6	PLO.7	PLO.8	PLO.9	CLO.1				✓						CLO.2					✓					CLO.3						✓			
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<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	<p>-</p>																																								
<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Konsep dasar geodesi terkait pemodelan matematis bumi berupa ellipsoida referensi dan bentuk geometris ellipsoida; 2. Sistem koordinat, dan pemecahan persoalan Geodesi menggunakan metode langsung/ direct problem dan metode tidak langsung /inverse problem dengan cara Legendre dan Gauss; 3. Macam-macam sistem proyeksi, pengertian faktor skala, transformasi sudut pada proyeksi konform, dan konvergensi meridian; 4. Perhitungan pada sistem proyeksi dengan cara Polieder, Mercator, Transverse Mercator dan Universal Transverse Mercator; 5. Transformasi Koordinat Geodesi ke Proyeksi Mercator dan sebaliknya; b. Transformasi Koordinat Geodesi ke Proyeksi UTM dan sebaliknya; <ol style="list-style-type: none"> 1. <i>Basic geodetic concepts related to earth mathematical modeling of reference ellipsoids and geometric shapes of ellipsoids;</i> 2. <i>Coordinate system, and Geodetic problem solving using direct method and inverse problem by Legendre and Gauss;</i> 3. <i>Various projection systems, the definition of scale factor, angular transformation of conformational projection, and meridian convergence;</i> 4. <i>Calculation of the projection system by means of Polieder, Mercator, Transverse Mercator and Universal Transverse Mercator;</i> 																																								

	<p>5. <i>Transforming Geodesy Coordinates to Mercator Projection and vice versa;</i></p> <p>6. <i>Geodetic Coordinate Transformation to UTM Projection and vice versa;</i></p>										
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1 <i>Excercise 1</i></td> <td>25%</td> </tr> <tr> <td>Tugas 2 <i>Excercise 2</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td>23%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td>27%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Excercise 1</i>	25%	Tugas 2 <i>Excercise 2</i>	25%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	23%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	27%
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Evaluasi Akhir Semester <i>Final Semester Exam</i>	27%										
<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with white board and power point presentation</p>										
<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Richardus, Adler. <i>Map Projections for Geodetic, Cartographers, Geographers</i>.1972. NHPC. Amsterdam. 2. Bomford. <i>Geodesy</i>. 1975. Oxford University Press. 3. MuljoSukojo, Bangun. <i>Hitung Proyeksi Geodesi</i>, 2004. Diktat ITS. Surabaya. 4. Prihandito, Aryono. <i>Proyeksi Peta</i>. 1988. Penerbit Kanisius. Yogyakarta. 5. Muryamto, Rochmad. <i>Hitungan Proyeksi Peta</i>. 1994. Diktat UGM. Yogyakarta. 										

3. Pemrograman Data Spasial / *Spatial Data Programming*

Nama modul <i>Module name</i>	Pemrograman Data Spasial <i>Spatial Data Programming</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235103
Mata kuliah <i>Course</i>	Pemrograman Data Spasial <i>Spatial Data Programming</i>
Semester <i>Semester</i>	I (satu) <i>I (one)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Dosen <i>Lecturer</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah wajib untuk Program Master Teknik Geomatika <i>Compulsory Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 2.5 jam x 16 minggu per semester <i>Lecture, 2.5 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	Kuliah: 2.5 jam x 14 minggu = 35 jam Penugasan terstruktur: 5 jam x 14 minggu = 70 jam Kegiatan mandiri: 6 jam x 14 minggu = 84 jam Ujian: 2.5 jam x 2 kali = 5 jam Total = 194 jam <i>Lecture: 2.5 hours x 14 weeks = 35 hours</i> <i>Structured exercises and assignments: 5 hours x 14 weeks = 70 hours</i> <i>Independent activities: 6 hours x 14 weeks = 84 hours</i> <i>Exam: 2.5 hours x 2 time = 5 hours</i> <i>Total = 194 hours</i>
Kredit <i>Credits</i>	3 SKS <i>3 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Pada mata kuliah ini, mahasiswa akan mempelajari dasar pemrograman, konsep dasar data spasial, menggunakan bahasa pemrograman R yang banyak digunakan untuk melakukan analisis komputasi numerik dan matematis, termasuk untuk mengolah, menyajikan dan menganalisa data spasial, baik vektor maupun raster.</p> <p><i>In this course, students will learn the basics of programming, the basic concepts of spatial data, using the R programming language which is widely used to perform numerical and mathematical computational analysis, including processing, presenting, and analyzing spatial data, both vector and raster.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu melakukan pengolahan data dan analisa berdasarkan grafik dan table dalam rangka memecahkan persoalan sederhana yang terkait dengan spasial. 2. Mahasiswa mampu melakukan dasar-dasar pengolahan data matriks serta mengaplikasikan dalam bentuk format data spasial raster. 3. Mahasiswa mampu melakukan pengolahan data dan analisa berdasarkan operasi geometrik dengan vektor dan raster. 4. Mahasiswa mampu melakukan pengolahan data dan analisa berdasarkan data spatio-temporal. 5. Mahasiswa mampu melakukan pengolahan data dan analisa berdasarkan klasifikasi citra satelit. <p><i>1. Students are able to do data processing and analysis based on graphs and tables in order to solve simple problems related to spatial.</i></p> <p><i>2. Students are able to do the basics of matrix data processing and apply it in the form of raster spatial data format.</i></p> <p><i>3. Students are able to perform data processing and analysis based on geometric operations with vectors and rasters.</i></p> <p><i>4. Students are able to carry out data processing and analysis based on spatio-temporal data.</i></p> <p><i>5. Students are able to carry out data processing and analysis based on satellite image classification.</i></p>

<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		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							✓			CLO.5							✓		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Konsep dasar data spasial, transformasi data spasial, sistem koordinat, sistem proyeksi, pemecahan persoalan pemrograman data spasial. Pengertian mengenai konsep dasar yang meliputi pengertian mengenai ellipsoida referensi, geometris ellipsoida, sistem koordinat. 2. Proyeksi peta yang meliputi macam-macam transformasi koordinat, macam-macam proyeksi. Pengertian faktor skala, dibicarakan mengenai pokok bahasan transformasi sudut pada proyeksi konform, dibicarakan mengenai pengertian konvergensi meridian. <ol style="list-style-type: none"> 1. <i>Basic concepts of spatial data, spatial data transformation, coordinate system, projection system, spatial data programming problem solving. Understanding of basic concepts that include the notion of reference ellipsoida, geometric ellipsoida, coordinate system.</i> 2. <i>A map projection that includes various coordinate transformations, various projections. Understanding the scale factor, discussed about the subject of angular transformation on conformational projection, discussed about the meridian convergence.</i> 																																																												
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas studi kasus <i>Assignment of case based</i></td> <td>20%</td> </tr> <tr> <td>Kognitif - Tugas <i>Cognitive - Assignment</i></td> <td>20%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td>20%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td>40%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas studi kasus <i>Assignment of case based</i>	20%	Kognitif - Tugas <i>Cognitive - Assignment</i>	20%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	20%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	40%																																																		
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<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with white board and power point presentation</p>
<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Mikhail,EM, <i>Analysis and Adjustment of Survey Measurements</i>, Dun Donnelley Publisher New York, 1976. 2. Spiegel, Murray R, <i>Probabilty and Statistics</i>, McGraw-Hill,1980 3. M.Molenaar, <i>Introduction to the theory of Observations</i>, ITC Enschede Belanda, 1977.

4. Aplikasi Geodesi Satelit / *Applications of Satellite Geodesy*

Nama modul <i>Module name</i>	Aplikasi Geodesi Satelit <i>Applications of Satellite Geodesy</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235104
Mata kuliah <i>Course</i>	Aplikasi Geodesi Satelit <i>Applications of Satellite Geodesy</i>
Semester <i>Semester</i>	I (satu) <i>I (one)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr. Eko Yuli Handoko, S.T., M.T.
Dosen <i>Lecturer</i>	Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D. Dr. Eko Yuli Handoko, S.T., M.T.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah wajib untuk Program Master Teknik Geomatika <i>Compulsory Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 Total = 82.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 28 hours</i> <i>Independent activities: 4 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 82.72 hours</i>
Kredit <i>Credits</i>	2 SKS <i>2 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mata kuliah ini mengkaji tentang Konsep sistem koordinat kartesian dan polar 2D dan 3D, kerangka referensi, sistem waktu sistem orbit, sinyal dan propagasi sinyal, medium perambatan sinyal (lapisan atmosfer), Jenis satelit dan aplikasinya seperti VLBI, SLR, LLR, GRACE, GOCE, Altimetry dan lainnya.</p> <p><i>This course examines the concept of 2D and 3D cartesian and polar coordinate systems, reference frames, orbital system time systems, signal and signal propagation, signal propagation medium (atmospheric layer), satellite types and their applications such as VLBI, SLR, LLR, GRACE, GOCE, Altimetry and others.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives / Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu menjelaskan sistem koordinat 2D dan 3D. 2. Mahasiswa mampu menjelaskan mengenai kerangka referensi baik kerangka referensi terikat langit dan kerangka referensi terikat bumi. 3. Mahasiswa mampu menjelaskan konsep sistem waktu. 4. Mahasiswa mampu menjelaskan konsep sinyal dan metode propagasi sinyal. 5. Mahasiswa mampu menjelaskan mengenai lapisan atmosfer dan perannya dalam geodesi satelit. 6. Mahasiswa mampu menjelaskan mengenai sistem orbit. 7. Mahasiswa mampu menjelaskan mengenai berbagai aplikasi geodesi satelit. <ol style="list-style-type: none"> 1. <i>Students are able to explain 2D and 3D coordinate systems.</i> 2. <i>Students are able to explain about reference frames both space fix reference frames and earth-fix reference frames.</i> 3. <i>Students are able to explain the concept of time system.</i> 4. <i>Students are able to explain the concept of signal and signal propagation method.</i> 5. <i>Students are able to explain the layers of the atmosphere and their role in satellite geodesy.</i> 6. <i>Students are able to explain the orbit system.</i> 7. <i>Students are able to explain about various applications of satellite geodesy.</i>

<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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					✓	✓				CLO.5					✓	✓				CLO.6				✓						CLO.7					✓	✓			
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<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	<p>-</p>																																																																																
<p>Pokok Bahasan <i>Content</i></p>	<ol style="list-style-type: none"> 1. Tujuan dan perkembangan satelit geodesi 2. Konsep dasar dari sistem satelit: sistem koordinat, sistem waktu, sistem orbit dan propagasi sinyal. 3. Sistem satelit geodesi untuk keperluan ilmu geodesi (<i>Geodetic Satellite Missions: Observing the Earth from Space</i>) 4. Dasar-dasar mekanika langit (<i>body problem</i>), Gangguan pergerakan satelit, Penentuan orbit, Konstelasi orbit satelit 5. Sistem Satelit GNSS: konsep dan aplikasi 6. Sistem Satelit VLBI, SLR, LLR: konsep dan aplikasi 7. Sistem satelit penginderaan jauh aktif dan pasif 8. Sistem Satelit Altimetry: konsep dan aplikasi 9. Sistem Satelit Gravity: konsep dan aplikasi <ol style="list-style-type: none"> 1. <i>The purpose and development of geodesy satellites</i> 2. <i>The basic concept of a satellite system: coordinate system, time system, orbit system and signal propagation.</i> 3. <i>Geodetic satellite systems for geodetic science (Geodetic Satellite Missions: Observing the Earth from Space)</i> 4. <i>The basics of celestial mechanics (body problem), satellite movement disturbances, orbit determination, satellite orbit constellation</i> 5. <i>GNSS Satellite System: concepts and applications</i> 6. <i>VLBI, SLR, LLR Satellite System: concepts and applications</i> 7. <i>Active and passive remote sensing Satellite Systems</i> 8. <i>Altimetry Satellite System: concepts and applications</i> 9. <i>Gravity Satellite System: concepts and applications</i> 																																																																																

Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Presentasi <i>Presentation</i></td> <td>30%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Term Exam</i></td> <td>20%</td> </tr> <tr> <td>Tugas <i>Assignment</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Exam</i></td> <td>25%</td> </tr> </tbody> </table>		Rencana Evaluasi	Bobot Weight	Presentasi <i>Presentation</i>	30%	Evaluasi Tengah Semester <i>Mid Term Exam</i>	20%	Tugas <i>Assignment</i>	25%	Evaluasi Akhir Semester <i>Final Exam</i>	25%
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Media yang digunakan <i>Media employed</i>												
Daftar Pustaka <i>Reading list</i>												
1. Seeber, G. (1993). <i>Satellite Geodesy, Foundations, Methods and Applications</i> . Berlin. New York: Walter de Gruyter. 2. Kaula, W.M. (2000). <i>Theory of Satellite Geodesy</i> . New York: Dover Publications, Inc. 3. Abidin, H.Z. (2001). <i>Geodesi Satelit</i> . P.T. Pradnya Paramita, Jakarta. ISBN 979-408-462-X.219 pp. 4. Torge, W. 2001. <i>Geodesy</i> . 3rd ed. Berlin: Walter de Gruyter.												

5. Metodologi Penelitian dan Penulisan Proposal / Research Methodology and Proposal Writing

Nama modul <i>Module name</i>	Metodologi Penelitian dan Penulisan Proposal <i>Research Methodology and Proposal Writing</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235201
Mata kuliah <i>Course</i>	Metodologi Penelitian dan Penulisan Proposal <i>Research Methodology and Proposal Writing</i>
Semester <i>Semester</i>	II (dua) <i>II (two)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr. Eko Yuli Handoko, S.T., M.T.
Dosen <i>Lecturer</i>	Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D. Dr. Eko Yuli Handoko, S.T., M.T.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah wajib untuk Program Master Teknik Geomatika <i>Compulsory Courses for Master Program of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 Total = 82.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 28 hours</i> <i>Independent activities: 4 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 82.72 hours</i>
Kredit <i>Credits</i>	2 SKS <i>2 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mata kuliah ini bertujuan untuk membekali para mahasiswa agar mampu mengidentifikasi, menganalisis, dan mengembangkan pengetahuan dan teknologi dalam teknik geomatika. Serta mahasiswa mampu untuk mengelola penelitian untuk pengembangan yang bermanfaat dalam kerangka pemikiran logis , kritis dan sistematis yang di terapkan dalam penyusunan tesis.</p> <p><i>This course aims to equip students with the ability to identify, analyze, and develop knowledge and technology in geomatics engineering. Students can also use critical, logical, and systematic thinking when they write their thesis to help them manage their research for useful growth.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mampu melakukan validasi akademik atau kajian sesuai bidang keahliannya dalam menyelesaikan masalah di masyarakat atau industri yang relevan melalui pengembangan pengetahuan dan keahliannya. 2. Mampu menyusun ide, hasil pemikiran, dan argumen saintifik secara bertanggung jawab dan berdasarkan etika akademik, serta mengkomunikasikannya melalui media kepada masyarakat akademik dan masyarakat luas. 3. Mampu mengidentifikasi bidang keilmuan yang menjadi obyek penelitiannya dan memosisikan ke dalam suatu peta penelitian yang dikembangkan melalui pendekatan interdisiplin atau multidisiplin. 4. Mampu mengambil keputusan dalam konteks menyelesaikan masalah pengembangan ilmu pengetahuan dan teknologi yang memperhatikan dan menerapkan nilai humaniora berdasarkan kajian analisis atau eksperimental terhadap informasi dan data. 5. Mampu meningkatkan kapasitas pembelajaran secara mandiri. 6. Mampu mendokumentasikan, menyimpan, mengamankan, dan menemukan kembali data hasil penelitian dalam rangka menjamin kesahihan dan mencegah plagiasi. 7. Mampu mengimplementasikan prinsip keberlanjutan dalam mengembangkan pengetahuan. 8. Memiliki pengetahuan tentang teori sains-rekayasa pada bidang teknik geomatika.

<p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. <i>Able to carry out academic validation or studies according to their field of expertise in solving problems in society or relevant industry through developing their knowledge and expertise.</i> 2. <i>Able to compile ideas, thoughts and scientific arguments responsibly and based on academic ethics, and communicate them through the media to the academic community and the wider community.</i> 3. <i>Able to identify the scientific field that is the object of research and position it on a research map developed through an interdisciplinary or multidisciplinary approach.</i> 4. <i>Able to make decisions in the context of solving science and technology development problems that pay attention to and apply humanities values based on analytical or experimental studies of information and data.</i> 5. <i>Able to increase learning capacity independently.</i> 6. <i>Able to document, store, secure and retrieve research data in order to ensure validity and prevent plagiarism.</i> 7. <i>Able to implement the principles of sustainability in developing knowledge.</i> 8. <i>Have knowledge of engineering sciences theory in the field of geomatics engineering.</i> 																																																																																										
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.8</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		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		✓	✓							CLO.5		✓	✓							CLO.6		✓	✓							CLO.7		✓	✓							CLO.8		✓	✓				✓		
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<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	<p style="text-align: center;">-</p>																																																																																										
<p>Pokok Bahasan</p>	<ol style="list-style-type: none"> 1. Persepsi penelitian 2. Konsep dasar dalam metodologi penelitian 3. Rumusan masalah untuk penelitian 4. Pengambilan sampel untuk penelitian 5. Metodologi survei 6. Struktur proposal dan laporan Thesis 7. Sitasi dan referensi 8. Gap Penelitian 																																																																																										

<p><i>Content</i></p>	<ol style="list-style-type: none"> 9. Teknik Presentasi 10. Menulis proposal penelitian 1. Research perceptions 2. Basic concepts in research methodology 3. Problem Formula for research 4. Plan sampling for research 5. Survey methodology 6. Structure of thesis proposal and report 7. Citations and references 8. Research Gaps 9. Presentation Techniques 10. Write a research proposal 										
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" data-bbox="711 703 1430 1099"> <thead> <tr> <th data-bbox="711 703 1238 779">Rencana Evaluasi</th> <th data-bbox="1238 703 1430 779">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 779 1238 857">Tugas 1 <i>Assessment 1</i></td> <td data-bbox="1238 779 1430 857">24%</td> </tr> <tr> <td data-bbox="711 857 1238 936">Tugas 2 <i>Assessment 2</i></td> <td data-bbox="1238 857 1430 936">21%</td> </tr> <tr> <td data-bbox="711 936 1238 1014">Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td data-bbox="1238 936 1430 1014">27%</td> </tr> <tr> <td data-bbox="711 1014 1238 1099">Evaluasi Akhir Semester <i>Final Exam</i></td> <td data-bbox="1238 1014 1430 1099">28%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assessment 1</i>	24%	Tugas 2 <i>Assessment 2</i>	21%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	27%	Evaluasi Akhir Semester <i>Final Exam</i>	28%
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Evaluasi Tengah Semester <i>Mid Semester Exam</i>	27%										
Evaluasi Akhir Semester <i>Final Exam</i>	28%										
<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with whiteboard and powerpoint presentation</p>										
<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Program Pasca Sarjana ITS, 2014, <i>Pedoman penyusunan thesis</i>, Pasca Sarjana ITS Surabaya. 2. Purbo-hadiwidjojo, 1993, <i>Menyusun Laporan Teknik</i>, Penerbit ITB, Bandung 3. Leedy, Paul D. and Jeanne Ellis Ormrod. 2010. <i>Practical Research: Planning and Design, Ninth Edition</i>. Pearson Education, Inc 										

6. Sistem Informasi Manajemen / Management Information System

Nama modul <i>Module name</i>	Sistem Informasi Manajemen <i>Management Information System</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235301
Mata kuliah <i>Course</i>	Sistem Informasi Manajemen <i>Management Information System</i>
Semester <i>Semester</i>	III (tiga) <i>III (three)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr. Ing. Ir. Teguh Hariyanto, M.Sc.
Dosen <i>Lecturer</i>	Dr. Ing. Ir. Teguh Hariyanto, M.Sc. Dr. Ir. Muhammad Taufik
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah wajib untuk Program Master Teknik Geomatika <i>Compulsory Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> Total = 161.96 hours</p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to</i>

<i>the examination regulations</i>	<i>take the exams</i>																																																		
Deskripsi Mata Kuliah <i>Description of Course</i>	<p>Pada mata kuliah ini, mahasiswa akan mempelajari konsep dan komponen dari sistem informasi manajemen. Serta, mahasiswa akan menerapkan sistem informasi manajemen. Selain itu, mahasiswa diminta untuk memahami penyusunan basis data pada sistem informasi manajemen. Lebih jauh lagi, mahasiswa diharapkan mampu mengaplikasikan metode sistem informasi manajemen.</p> <p><i>In this course, students will learn the concepts and components of management information systems. Also, students will understand and apply the management information system by developing database systems.</i></p>																																																		
Capaian Pembelajaran / Course Learning Outcomes <i>Module objectives/ Course learning outcomes</i>	<ol style="list-style-type: none"> 1. Mahasiswa dapat memahami dan mengerti tentang konsep SIM, komponen dan penerapannya. 2. Mahasiswa mengetahui serta memahami proses dalam penyusunan SBD di SIM. 3. Mahasiswa mengerti manfaat dari metoda SIM serta bidang lain yang terkait. 4. Mahasiswa memahami dan mampu dalam mengaplikasikan metoda SIM beserta pengembangannya dalam perencanaan desiminasi informasi geospasial dan jaringannya. <ol style="list-style-type: none"> 1. <i>Students can understand and understand the concept of MIS, its components and applications.</i> 2. <i>Students know and understand the process in the preparation of DBMS in SIM.</i> 3. <i>Students understand the benefits of the SIM method and other related fields.</i> 4. <i>Students understand and are able to apply the SIM method and its development in planning the dissemination of geospatial information and its network.</i> 																																																		
CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i>	<table border="1"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <th>CLO.4</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>		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						✓		✓	✓
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Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i>	-																																																		
Pokok Bahasan	<ol style="list-style-type: none"> 1. Prinsip dan Komponen Sistem Informasi manajemen 																																																		

<p><i>Content</i></p>	<ol style="list-style-type: none"> 2. Prinsip dan Komponen Sistem Informasi manajemen Menggunakan Teknologi Terkini 3. Pengembangan perencanaan sistem manajemen di Indonesia dan berbagai negara 4. Pendahuluan sistem informasi manajemen 5. Teknologi GIS yang digunakan dalam sistem manajemen 6. Metodologi dalam pembuatan sistem informasi manajemen 7. Desain sebuah GUI pada sistem informasi manajemen untuk desiminasi informasi <ol style="list-style-type: none"> 1. <i>Principles and components in management information system</i> 2. <i>Principles and components in management information system using latest technology</i> 3. <i>Development of management system in Indonesia and other countries</i> 4. <i>Background of management information system</i> 5. <i>GIS technology to use in management information system</i> 6. <i>Methods in the generation of management information system</i> 7. <i>GUI design development in management information system for information dissemination</i> 										
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" data-bbox="711 1263 1426 1659"> <thead> <tr> <th data-bbox="711 1263 1238 1341">Rencana Evaluasi</th> <th data-bbox="1238 1263 1426 1341">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 1341 1238 1420">Studi Kasus <i>Case Method</i></td> <td data-bbox="1238 1341 1426 1420">25%</td> </tr> <tr> <td data-bbox="711 1420 1238 1498">Evaluasi Tengah Semester <i>Middle Semester Examination</i></td> <td data-bbox="1238 1420 1426 1498">25%</td> </tr> <tr> <td data-bbox="711 1498 1238 1576">Hasil Proyek <i>Team Based Project</i></td> <td data-bbox="1238 1498 1426 1576">25%</td> </tr> <tr> <td data-bbox="711 1576 1238 1659">Evaluasi Akhir Semester <i>Final Semester Examination</i></td> <td data-bbox="1238 1576 1426 1659">25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Studi Kasus <i>Case Method</i>	25%	Evaluasi Tengah Semester <i>Middle Semester Examination</i>	25%	Hasil Proyek <i>Team Based Project</i>	25%	Evaluasi Akhir Semester <i>Final Semester Examination</i>	25%
Rencana Evaluasi	Bobot Weight										
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Evaluasi Akhir Semester <i>Final Semester Examination</i>	25%										
<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with white board and power point presentation</p>										
<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Effy Oz, 2008, Management Information Systems Sixth Edition 6th Edition, Course Technology, USA 1. Pearlson, K.E., Saunders, C.S., and Galletta, D.F., 2019, Managing and Using Information Systems: A Strategic Approach 7th Edition, Wiley 2. Brody, D., 2019, Information Systems and 										

	Management, Clanrye International
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7. Tesis / Thesis

Nama modul <i>Module name</i>	Tesis <i>Thesis</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235401
Mata kuliah <i>Course</i>	Tesis <i>Thesis</i>
Semester <i>Semester</i>	IV (empat) <i>IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D.
Dosen <i>Lecturer</i>	Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah wajib untuk Program Master Teknik Geomatika <i>Compulsory Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	Kuliah: 1.67 jam x 14 minggu = 23.38 jam Penugasan terstruktur: 4 jam x 14 minggu = 56 jam Kegiatan mandiri: 4 jam x 14 minggu = 56 jam Ujian: 1.67 jam x 2 kali = 3.34 jam Total = 138.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 56 hours</i> <i>Independent activities: 4 hours x 14 weeks = 56 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 138.72 hours</i>
Kredit <i>Credits</i>	8 SKS <i>8 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>
Deskripsi Mata Kuliah	Mata kuliah Tesis merupakan mata kuliah pemuncak untuk program magister sebagai salah satu syarat untuk menyelesaikan studi program magister. Penelitian tesis

<p><i>Description of Course</i></p>	<p>merupakan puncak dari semua ilmu yang diperoleh mahasiswa selama studi dan validasi ilmiah serta keahlian yang telah diperoleh. Mahasiswa wajib menuliskan hasil penelitiannya di buku Tesis dan mengikuti ujian/sidang Tesis serta mempublikasikan hasil penelitian tersebut di tingkat internasional baik dalam seminar internasional maupun jurnal internasional atau dalam jurnal nasional terakreditasi sebagai salah satu syarat kelulusan.</p> <p><i>Thesis course is a capstone course for the master's program as one of the requirements for completing the master's program study. Thesis research is the capstone of all the knowledge that students gain during their studies and scientific validation and expertise that has been obtained. Students are required to write their research results in the Thesis book and take the Thesis examination/trial and publish the research results at the international level, either in international seminars or in international journals or in accredited national journals as one of the graduation requirements.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Menguasai konsep dan prinsip keilmuan dan rekayasa secara komprehensif, dan pengetahuan faktual tentang teknologi informasi dan komunikasi dan teknologi terbaru untuk mengembangkan prosedur dan strategi yang diperlukan untuk analisis dan desain sistem dalam bidang Teknik Geomatika dan aplikasinya yang menjadi topik bahasan. 2. Mampu memformulasikan dan menyusun penyelesaian permasalahan rekayasa, menghasilkan rancangan sistem dan mengimplementasikan alternatif penyelesaian permasalahan rekayasa dengan melakukan perluasan keilmuan yang mengadaptasi perubahan ilmu pengetahuan atau teknologi dalam bidang Teknik Geomatika yang menjadi topik bahasan. 3. Mampu menghasilkan tesis yang layak untuk dipublikasikan dalam jurnal ilmiah dengan memanfaatkan teknologi baik software/hardware dalam melakukan eksperimen terkait dengan analisis dan desain sistem yang menjadi topik bahasan. 4. Berusaha secara maksimal dalam menyelesaikan permasalahan di bidang Teknik Geomatika yang menjadi topik bahasan untuk mencapai hasil yang sempurna.

<p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. <i>Mastering the concepts and principles of scientific and engineering comprehensively, and factual knowledge about information and communication technology and the latest technology to develop procedures and strategies needed for the analysis and design of systems in the field of Geomatics Engineering and its applications which are the topic of discussion.</i> 2. <i>Being able to formulate and compile engineering problem solving, produce system designs and implement alternative engineering problem solving by expanding knowledge that adapts changes in science or technology in the field of Geomatics Engineering which is the topic of discussion.</i> 3. <i>Being able to produce a feasible thesis to be published in scientific journals by utilizing both software / hardware technology in conducting experiments related to system analysis and design which is the topic of discussion.</i> 4. <i>Striving maximally in solving problems in the field of Geomatics Engineering which is the topic of discussion to achieve perfect results.</i> 																																																		
<p>CPL Prodi yang dibebankan <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 1093 1283 1317"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <th>CLO.4</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> </tr> </tbody> </table>		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						✓		✓	✓
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<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	<p>Metodologi Penelitian dan Penulisan Proposal <i>Research Methodology and Proposal Writing</i></p>																																																		
<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Pendahuluan (Latar belakang, Perumusan Masalah, Tujuan, Kontribusi dan Metodologi Penelitian) 2. Kajian Penelitian dan Dasar Teori 3. Metodologi Penelitian 4. Hasil Penelitian dan Pembahasan 5. Kesimpulan dan Saran <ol style="list-style-type: none"> 1. <i>Introduction (Background, Problem Formulation, Objectives, Contributions)</i> 2. <i>Research Studies and Basic Theory</i> 3. <i>Research Methodology</i> 4. <i>Research Results and Discussion</i> 5. <i>Conclusions and Suggestions</i> 																																																		

Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Ujian Proposal <i>Proposal examination</i></td> <td>15%</td> </tr> <tr> <td>Proses Penulisan Tesis <i>Thesis writing process assessment</i></td> <td>22%</td> </tr> <tr> <td>Laporan Tesis <i>Thesis Writing Process</i></td> <td>23%</td> </tr> <tr> <td>Ujian Tesis <i>Thesis examination</i></td> <td>40%</td> </tr> </tbody> </table>		Rencana Evaluasi	Bobot Weight	Ujian Proposal <i>Proposal examination</i>	15%	Proses Penulisan Tesis <i>Thesis writing process assessment</i>	22%	Laporan Tesis <i>Thesis Writing Process</i>	23%	Ujian Tesis <i>Thesis examination</i>	40%
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Ujian Tesis <i>Thesis examination</i>	40%											
Media yang digunakan <i>Media employed</i>	Presentasi PPT dan Laporan <i>Power point presentation and reporting</i>											
Daftar Pustaka <i>Reading list</i>	<ol style="list-style-type: none"> 1. Program Pasca Sarjana ITS, 2020, <i>Pedoman Penyusunan Tesis</i>, Pasca Sarjana ITS Surabaya. 2. Purbo-hadiwidjojo, 1993, <i>Menyusun Laporan Teknik</i>, Penerbit ITB, Bandung 3. Leedy, Paul D. and Jeanne Ellis Ormrod. 2010. <i>Practical Research: Planning and Design, Ninth Edition</i>. Pearson Education, Inc 4. Buku teks yang mendukung / <i>Supporting texbooks</i> 5. Makalah dari jurnal atau konferensi yang mendukung / <i>Papers from supporting journals or conferences</i> 											

<p>Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i></p>	<p>Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i></p>
<p>Deskripsi Mata Kuliah <i>Description of Course</i></p>	<p>Pada mata kuliah ini, mahasiswa akan mempelajari analisa data GNSS. Serta, analisa data GNSS tersebut dihubungkan dengan kejadian bencana alam seperti gempa dan gunung meletus. Hubungan tersebut dilihat sebelum, saat, dan setelah kejadian bencana. Selain itu, data GNSS tersebut juga diturunkan untuk mendapatkan dan menganalisa data ionosfer dan troposfer dengan pemograman secara manual</p> <p><i>In this course, students will learn how to conduct analysis from GNSS data. Further, the analysis is linked with several natural disaster events including earthquake and volcanic eruption. The links are considered before, during, and after the event. Besides that, the GNSS data is derivated to obtain and analyze ionosphere and troposphere data using manual programming.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa memiliki pengetahuan tentang konsep GNSS 2. Mahasiswa memiliki pengetahuan tentang propagasi sinyal 3. Mampu memiliki pengetahuan dan pengalaman mengukur beserta menghitung pengukuran jarak baik dengan menggunakan pseudorange maupun menggunakan fase 4. Mampu menjelaskan kesalahan dan bias pada 3 segmen GNSS beserta bagaimanakah cara menghilangkan kesalahan tersebut. 5. Mampu melakukan pengukuran dengan menggunakan beberapa metode pada pengukuran GNSS. 6. Mampu melakukan pengolahan data dengan menggunakan perangkat lunak ilmiah dan komersial 7. Mampu mengungkapkan ide atau gagasan mereka secara lisan dan tertulis <p><i>1. Students have knowledge of the concept of GNSS 2. Students have knowledge of signal propagation</i></p>

	<ol style="list-style-type: none"> 3. <i>Able to have knowledge and experience in measuring and calculating distance measurements both using pseudorange and using phase</i> 4. <i>Able to explain errors and biases in the 3 GNSS segments and how to eliminate these errors.</i> 5. <i>Able to perform measurements using several methods of measuring GNSS.</i> 6. <i>Able to perform data processing using scientific and commercial software</i> 7. <i>Able to express their ideas or concepts verbally and in writing.</i> 																																																																																
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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				✓		✓				CLO.5					✓					CLO.6				✓		✓				CLO.7					✓	✓			
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<p>Pokok Bahasan <i>Content</i></p>	<ol style="list-style-type: none"> 1. Definisi dan konsep GNSS 2. Definisi dan konsep teknologi kebumihan 3. Perkembangan teknologi sinyal 4. Sinyal elektromagnet dalam sinyal GNSS 5. Pengukuran jarak dengan menggunakan fase dan kode dalam pengukuran GNSS 6. Differential data 7. Sistem orbit, kesalahan, bias dan metode pengukuran Sistem Navigasi Satelit Global 8. Pengolahannya data menggunakan perangkat lunak komersial maupun ilmiah. 																																																																																
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Rencana Evaluasi</th> <th style="text-align: center;">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1 <i>Assesment 1</i></td> <td style="text-align: center;">23%</td> </tr> <tr> <td>Tugas 2 <i>Assesment 2</i></td> <td style="text-align: center;">23%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Middle Term Examination</i></td> <td style="text-align: center;">26%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assesment 1</i>	23%	Tugas 2 <i>Assesment 2</i>	23%	Evaluasi Tengah Semester <i>Middle Term Examination</i>	26%																																																																								
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	Evaluasi Akhir Semester <i>Final Term Examination</i>	28%
Media yang digunakan <i>Media employed</i>	Classical teaching tools with white board and powerpoint presentation	
Daftar Pustaka <i>Reading list</i>	<ol style="list-style-type: none"> 1. Wolf, 2010. Elementary Surveying 2. Abidin, H.Z., 2005. Geodesi Satelit 3. Abdiin, H.Z., 2005. Survei Satelit 	

2. Pemodelan Deformasi dan Geodinamika / *Deformation and Geodynamics Modelling*

Nama modul <i>Module name</i>	Pemodelan Deformasi dan Geodinamika <i>Deformation and Geodynamics Modelling</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	RM185902
Mata kuliah <i>Course</i>	Pemodelan Deformasi dan Geodinamika <i>Deformation and Geodynamics Modelling</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D.
Dosen <i>Lecturer</i>	Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D. Dr. Eko Yuli Handoko, S.T., M.T.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Matakuliah Pilihan Wajib Bidang Minat untuk Program Master Teknik Geomatika <i>Elective Course (Mandatory for the Chosen Area of Specialist) for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 2.5 jam x 16 minggu per semester <i>Lecture, 2.5 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>Kuliah: 2.5 jam x 14 minggu = 35 jam Penugasan terstruktur: 2.5 jam x 14 minggu = 35 jam Kegiatan mandiri: 2.5 jam x 14 minggu = 35 jam Ujian: 2.5 jam x 2 kali = 5 jam Paper review: 3 jam x 14 = 42 jam Studi Case-based: 3 jam x 14 = 42 jam Total = 194 jam</p> <p><i>Lecture: 2.5 hours x 14 weeks = 35 hours Structured exercises and assignments: 2.5 x 14 weeks = 35 hours Independent activities: 2.5 x 14 weeks = 35 hours Exam: 2.5 hours x 2 time = 5 hours Paper review: 3 jam x 14 = 42 hours Case-based study: 3 jam x 14 = 42 hours Total = 194 hours</i></p>
Kredit <i>Credits</i>	3 SKS <i>3 credits</i>

<p>Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i></p>	<p>Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i></p>
<p>Deskripsi Mata Kuliah <i>Description of Course</i></p>	<p>Dalam kuliah ini dipelajari mengenai ilmu dan konsep dari geodinamika terkait struktur dan dinamika bumi seperti fenomena gunung api, pergerakan lempeng (landslide dan gempa). Setelah mempelajari studi geodinamika ini diharapkan dapat membuka wawasan mahasiswa mengenai pemanfaatan, pengembangan konsep dan prinsip ilmu untuk pengolahan, analisis dan pemodelan data sehingga dapat digunakan untuk kepentingan penelitian mandiri dan pemanfaatan dalam mitigasi bencana. <i>In this lecture is studied about the science and concepts of geodynamics related to the structure and dynamics of the earth such as volcanic phenomena, the movement of plates (landslide and earthquake). After studying this geodynamic study, it is expected to open the students' insight into the utilization, concept development and science principles for processing, data analysis and data modelling so that it can be used for independent research and utilization in disaster mitigation.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes <i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mampu menjelaskan fenomena geodinamika Bumi yang terkait dengan struktur Bumi dan teori tektonik lempeng. 2. Mampu mengidentifikasi jenis-jenis fenomena geodinamika Bumi. 3. Mampu mengidentifikasi teknologi geodesi yang dapat digunakan untuk melakukan pengamatan geodinamika Bumi. 4. Mampu melakukan pengamatan dan analisa geodinamika Bumi menggunakan metode geodetik. 5. Mampu menjelaskan aspek geodesi dalam studi deformasi. 6. Mampu melakukan studi dan analisis deformasi menggunakan data pengamatan geodetik. 7. Mampu menggunakan hasil analisa geodinamika dan deformasi untuk mitigasi bencana. <ol style="list-style-type: none"> 1. <i>Able to explain the Earth's geodynamic phenomena related to the structure of the Earth and plate tectonic theory.</i> 2. <i>Able to identify various types of the Earth's geodynamic phenomena.</i>

	<ol style="list-style-type: none"> 3. <i>Able to identify geodetic technology that can be used to carry out geodynamic observations of the Earth.</i> 4. <i>Able to perform observations and analyze the Earth's geodynamics using geodetic methods.</i> 5. <i>Able to explain the geodetic aspects in deformation studies.</i> 6. <i>Able to perform studies and analysis of deformation using geodetic observation data.</i> 7. <i>Able to use the results of geodynamic and deformation analysis for disaster mitigation.</i> 																																																																																
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 622 1283 969"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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					✓	✓				CLO.5					✓	✓				CLO.6					✓	✓				CLO.7					✓	✓			
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<p>Pada kuliah ini mata kuliah yang diberikan adalah:</p> <ol style="list-style-type: none"> 1. Pengantar Geodinamika dan Deformasi: Pengantar, Gaya Endogen dan Gaya Eksogen. 2. Struktur bumi: lapisan bumi, inti bumi, dan karakteristik bumi. 3. Lempeng tektonik: teori rekayasa lempeng, pergeseran benua, dan studi geologi. 4. Fenomena geodinamika: gunung berapi, longsor, dan gempa bumi. 5. Metode dan survei geodinamika: studi geodinamika dengan SLR, VLBI, dan GPS. 6. Studi geodinamika: studi tentang pergerakan lempeng global, regional, dan mitigasi bencana. <p><i>In this lecture the subjects given are:</i></p> <ol style="list-style-type: none"> 1. <i>Introduction to Geodynamics and Deformation: Introduction, Endogenous styles, and exogenous styles.</i> 2. <i>Earth structure: the earth's layers, the earth's core, and the earth's characteristics.</i> 3. <i>Plate tectonics: plate engineering theory, continental drift, and geological studies.</i> 4. <i>Geodynamic phenomena: volcanoes, land slides, and earthquakes.</i> 																																																																																

	<p>5. <i>Geodynamic methods and surveys: geodynamic studies with SLR, VLBI, and GPS.</i></p> <p>6. <i>Geodynamic studies: study of global plate movements, regional, and disaster mitigation.</i></p>														
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1 : Studi kasus <i>Assignment 1: Case Study</i></td> <td>15%</td> </tr> <tr> <td>Tugas 2: Proyek tim <i>Assignment 2: Team Project</i></td> <td>25%</td> </tr> <tr> <td>Presentasi hasil proyek <i>Project presentation</i></td> <td>10%</td> </tr> <tr> <td>Tugas 3: Studi kasus <i>Assignment 3: Case Study</i></td> <td>15%</td> </tr> <tr> <td>Tugas 4: Proyek tim <i>Assignment 4: Team Project</i></td> <td>25%</td> </tr> <tr> <td>Presentasi hasil proyek <i>Project presentation</i></td> <td>10%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 : Studi kasus <i>Assignment 1: Case Study</i>	15%	Tugas 2: Proyek tim <i>Assignment 2: Team Project</i>	25%	Presentasi hasil proyek <i>Project presentation</i>	10%	Tugas 3: Studi kasus <i>Assignment 3: Case Study</i>	15%	Tugas 4: Proyek tim <i>Assignment 4: Team Project</i>	25%	Presentasi hasil proyek <i>Project presentation</i>	10%
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<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Turcotte, D. L and G. Schubert. 2002. <i>Geodynamics (2nd Ed)</i>. Cambridge University Press, Cambridge. 2. Caspary, W.F. 1998. <i>Concepts of Network and Deformation Analysis</i>. Monograph 11, School of Surveying, The University of New South Wales. 3. Smith, D. E and D.L. Turcotte. 2013. <i>Contribution of Space Geodesy to Geodynamics</i>. Published by the American Geophysical. 4. Stacey, F. D and P.M. Davis. 2008. <i>Physics of the Earth (4th Ed)</i>. Cambridge University Press, New York. <p>c. Segall, Paul. 2010. <i>Earthquake and Volcano Deformation</i>. Princenton University Press. Pricenton. New Jersey.</p>														

3. Pemodelan Gayaberat Bumi / *Earth Gravity Modelling*

Nama modul <i>Module name</i>	Pemodelan Gayaberat Bumi <i>Earth Gravity Modelling</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235503
Mata kuliah <i>Course</i>	Pemodelan Gayaberat Bumi <i>Earth Gravity Modelling</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D.
Dosen <i>Lecturer</i>	Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Matakuliah ini mempelajari pemodelan bentuk dan ukuran Bumi (Geoid) menggunakan data gayaberat dengan berbagai metode.</p> <p><i>This course studies the modeling of the shape and size of the Earth (Geoid) using gravity data with various methods.</i></p>																																								
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mampu menjelaskan konsep dasar berbagai metode pemodelan geoid. 2. Mampu membuat model geoid gravimetrik menggunakan berbagai metode dari data gayaberat yang didapatkan dari pengukuran. 3. Mampu melakukan analisis dan validasi terhadap model geoid yang dihasilkan. <p><i>1. Able to explain the basic concepts of various geoid modeling methods.</i></p> <p><i>2. Able to create gravimetric geoid models using various methods from gravity data obtained from measurements.</i></p> <p><i>3. Able to perform analysis and validation of the resulting geoid model.</i></p>																																								
<p>CPL Prodi yang dibebankan</p> <p><i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PLO.1	PLO.2	PLO.3	PLO.4	PLO.5	PLO.6	PLO.7	PLO.8	PLO.9	CLO.1					✓	✓				CLO.2					✓	✓				CLO.3					✓	✓			
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Teori dasar gayaberat Bumi 2. Pengukuran dan reduksi anomali gayaberat Bumi 3. Model Gayaberat Bumi Global 4. Solusi Integral Stokes <ol style="list-style-type: none"> a. Direct Numerical Integration b. FFT c. LSC 5. Pemodelan Geoid Gravimetrik 6. Pemodelan Geoid menggunakan Gravsoft <p><i>1. The basic theory of Earth's gravity</i></p> <p><i>2. Measurement and reduction of the Earth's gravity anomaly</i></p> <p><i>3. Global Earth Gravity Model</i></p>																																								

	<p>4. <i>Stokes Integral Solution</i></p> <p>a. <i>Direct Numerical Intregation</i></p> <p>b. <i>FFT</i></p> <p>c. <i>LSC</i></p> <p>5. <i>Gravimetric Geoid Modelling</i></p> <p>6. <i>Geoid Modeling using Gravsoft</i></p>														
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<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> Hofmann-Wellenhof, B. and H. Moritz. 2005. <i>Physical Geodesy</i>. Vienna: Springer. Bomford, G. 1980. <i>Geodesy</i>, Oxford University Press, Oxford Torge, W. 2001. <i>Geodesy</i>. de Gruyter, Berlin. Vaníček, P. and E.J. Krakiwsky.1986. <i>Geodesy: the Concepts</i>. 2nd ed. Amsterdam: Elsevier Torge, W. 1989. <i>Gravimetry</i>. de Gruyter, Berlin. Blakely, R.J. 1994. <i>Potential Theory in Gravity and Magnetic Applications</i>, Cambridge University Press, Cambridge. Chuji Tsuboi. 1979. <i>Gravity</i>, Allen & Unwin, London. 														

4. Mitigasi Bencana / *Disaster Mitigation*

Nama modul <i>Module name</i>	Mitigasi Bencana <i>Disaster Mitigation</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235504
Mata kuliah <i>Course</i>	Mitigasi Bencana <i>Disaster Mitigation</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr. Ir. Amien Widodo, M.Si.
Dosen <i>Lecturer</i>	Dr. Ir. Amien Widodo, M.Si.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i></p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian	Minimum 80% kehadiran untuk mengikuti ujian tertulis

<p><i>Content</i></p>	<p><i>This course studies the description of risks, threats, and disasters. Types of disasters and the history of disaster management in Indonesia. Disaster management based on regulations in Indonesia. Geological characteristics of earthquakes, tsunamis, volcanic mountains, erosion, sedimentation, and flash floods. Project-based priority on landslide disaster mitigation. Guest lectures on disasters and writing scientific articles/papers on disasters.</i></p>												
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<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Hamblin, W.K., 1982; The Earth's Dynamic Systems; 3rd Edition. Minesotta. 2. Geoinformatics for Disasters ://nidm.gov.in/PDF/modules/geo.pdf 3. https://www.bnpb.go.id/home/get_publicasi/12/buku 4. https://www.bnpb.go.id/home/get_publicasi/13/jurnal 												

<p><i>Content</i></p>	<ol style="list-style-type: none"> 7. Pengaruh dari perubahan iklim terhadap kandungan parameter fisis cuaca 8. Karakteristik atmosfer luar angkasa dan sifat fisisnya 9. Karakteristik variasi spasial dan temporal dari atmosfer luas angkasa 10. Karakteristik lapisan ionosfer dan sifat fisisnya 11. Konsep GPS/GNSS tomografi 12. Gangguan ionosfer dari aktivitas bumi padat <ol style="list-style-type: none"> 1. <i>Hydro-meteorological phenomena and parameters that cause dynamics in weather and climate</i> 2. <i>Characteristics of the atmosphere based on height, physical properties, its influence on wave propagation and phenomena</i> 3. <i>GPS/GNSS observation system, sources of error and methods for reducing</i> 4. <i>The physical properties of the troposphere layer and its influence on the propagation</i> 5. <i>Phenomena that influence water vapor levels and methods for calculating them</i> 6. <i>The amount of water vapor content and water vapor phenomena and phenomena that influence</i> 7. <i>The influence of climate change on the physical parameters of weather</i> 8. <i>Characteristics of the outer space atmosphere and its physical properties</i> 9. <i>Characteristics of spatial and temporal variations in the vast atmosphere</i> 10. <i>Characteristics of the ionosphere layer and its physical properties</i> 11. <i>The concept of GPS/GNSS tomography</i> 12. <i>Ionospheric disturbances from solid earth activity</i> 										
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	5. <i>Satellite altimetry applications in the field of geodesy and related fields</i>										
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<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Dalam mata kuliah ini akan dipelajari global geodesy observing system (GGOS)s ebagai kontribusi dari ilmu geodesi dalam mempelajari sistem Bumi, dinamikanya, responnya terhadap perubahan iklim. Perkembangan dari teknik geodesi modern terutama yang berbasis satelite menjadi komponen utama dalam GGOS.</p> <p><i>In this course, global geodesy observing systems (GGOS) will be studied as a contribution from the science of geodesy in studying the Earth system, its dynamics, and its response to climate change. The development of modern geodetic techniques, especially satellite-based ones, is a main component in GGOS.</i></p>																																																		
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mampu menjelaskan tujuan, capaian, and teknologi terkini dari geodesi 2. Mampu menjelaskan kontribusi ilmu kebumihan khususnya persyaratan geodesi dalam memahami dinamika planet 3. Mampu menjelaskan dan mendeskripsikan pentingnya observasi Bumi dalam memenuhi kebutuhan masyarakat yang semakin global 4. Mampu mengidentifikasi dan memanfaatkan teknik-teknik geodesi modern dalam GGOS dan pemanfaatannya dalam isu-isu masyarakat global <ol style="list-style-type: none"> 1. <i>Able to explain the goals, achievements, and latest techbology in geodesy</i> 2. <i>Able to explain the contribution of the Earth science especially requirements for geodesy in understanding the dynamic planet</i> 3. <i>Able to to elaborate the importance of Earth observation in serving the needs of an increasingly global society</i> 4. <i>Able to identify and utilize the modern geodetic techniques in GGOS and their use in global societal issues</i> 																																																		
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<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mampu menganalisa penggunaan rumus dasar matematika, geometri dan trigonometri 2. Mampu menganalisa tinggi dan kemiringan bangunan 3. Mampu menganalisa pematokan (uit zet) untuk bangunan 4. Mampu menganalisa volume galian tanah (galian timbunan) <ol style="list-style-type: none"> 1. <i>Able to analyze the use of basic mathematics, geometrics and trigonometry formulas</i> 2. <i>Able to analyze the height and slope of buildings</i> 3. <i>Able to analyze benchmarking (uit zet) for buildings</i> 4. <i>Able to analyze the volume of soil excavation (excavation embankment)</i> 																																																		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Konsep kalkulus untuk survei rekayasa 2. Geometri jalan raya 3. Konsep Alinemen horisontal 4. Staking Out Alinemen Horisontal 5. Konsep Alinemen vertikal 6. Staking Out Alinemen vertikal 7. Konsep koordinat untuk melakukan uitzet bangunan 8. Konsep koordinat untuk Menghitung tinggi bangunan dan kemiringan bangunan <ol style="list-style-type: none"> 1. <i>Basic concepts of calculus for engineering surveys</i> 2. <i>Highway geometry in general</i> 3. <i>Basic concept of horizontal alignment</i> 4. <i>Staking out horizontal alignment</i> 5. <i>Basic concept of vertical alignment</i> 6. <i>Staking out vertical alignment</i> 7. <i>The concept of coordinates to carry out building uitzets</i> 8. <i>Coordinate concepts to calculating building height and building slope.</i> 																																																		

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<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu menjelaskan tentang dasar hukum normatif kegiatan pendaftaran tanah dan beberapa hal yang terkait. 2. Mahasiswa mampu menjelaskan tentang cara pembuatan peta pendaftaran tanah dan pendukungnya (gambar ukur, peta bidang). 3. Mahasiswa mampu menjelaskan perbandingan sistem pendaftaran tanah di Indonesia dengan di negara lain 4. Mahasiswa mampu mengaplikasikan ide atau gagasan mereka secara lisan dan tertulis dalam bidang pertanahan <ol style="list-style-type: none"> 1. <i>Students are able to explain the normative legal basis for land registration activities and several related matters.</i> 2. <i>Students are able to explain how to make land registration maps and their supporting documents (survey drawing, parcel maps).</i> 3. <i>Students are able to explain the comparison of the land registration system in Indonesia and in other countries.</i> 4. <i>Students are able to implement their ideas orally and in writing related to land sector</i> 																																																		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Tanah dan Manusia 2. Pengantar Permasalahan Pertanahan 3. Hukum Agraria 4. Penguasaan tanah 5. UUPA tahun 1960 6. Administrasi Pertanahan 7. Pendaftaran Tanah Sistematis Lengkap (PTSL) 8. Pengadaan Tanah 9. Manajemen Pertanahan 10. Konsolidasi Pertanahan <ol style="list-style-type: none"> 1. <i>Land and People</i> 																																																		

	<ol style="list-style-type: none"> 2. <i>Introduction to Land Issues</i> 3. <i>Agrarian Law</i> 4. <i>Land Tenure</i> 5. <i>UUPA 1960</i> 6. <i>Land Administration</i> 7. <i>Complete Systematic Land Registration</i> 8. <i>Land Acquisition</i> 9. <i>Land Management</i> 10. <i>Land Consolidation</i> 										
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<p><i>Module objectives / Course learning outcomes</i></p>	<ol style="list-style-type: none"> 2. Mahasiswa memahami dan dapat menjelaskan proses penaksiran harga di perkotaan 3. Mahasiswa memahami tentang perhitungan pajak yang terkait dengan property 4. Mahasiswa memahami dan dapat menganalisa proses pembuatan zona nilai tanah <ol style="list-style-type: none"> 1. <i>Students understand the basic concepts of land appraisal</i> 2. <i>Students understand and can explain the price estimation process in urban areas</i> 3. <i>Students understand the calculation of taxes related to property</i> 4. <i>Students understand and can analyze the process of creating land value zones</i> 																																																		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Konsep dasar penilaian tanah 2. Konsep penilaian properti 3. Metode pendekatan penilaian properti 4. Teknik penaksiran harga perkotaan 5. Penilaian tanah dengan pendekatan keruangan dan Perhitungan BPHTB 6. Peta visualisasi nilai tanah 7. Zona nilai tanah dan analisa sederhana <ol style="list-style-type: none"> 1. <i>The basic concepts of land appraisal</i> 2. <i>The concept of property appraisal</i> 3. <i>The property appraisal approach method</i> 4. <i>Urban price estimation techniques</i> 5. <i>Land assessment using a spatial approach and BPHTB calculations</i> 6. <i>Visualize land values in a map</i> 7. <i>Land value zones and simple analysis</i> 																																																		

Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1 <i>Assignment 1</i></td> <td>20%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td>30%</td> </tr> <tr> <td>Tugas 2 <i>Assignment 2</i></td> <td>20%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td>30%</td> </tr> </tbody> </table>		Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assignment 1</i>	20%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	30%	Tugas 2 <i>Assignment 2</i>	20%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	30%
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Evaluasi Akhir Semester <i>Final Semester Exam</i>	30%											
Media yang digunakan <i>Media employed</i>												
Classical teaching tools with whiteboard and powerpoint presentation												
Daftar Pustaka <i>Reading list</i>												

<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives / Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu menjelaskan tentang pengetahuan konsep sistem informasi pertanahan 2. Mahasiswa mampu mengimplementasikan pengetahuan tentang sistem informasi untuk membuat aplikasi pertanahan dengan SIG 3. Mahasiswa mampu menyajikan dan menganalisa sistem informasi pertanahan 4. Mahasiswa mampu menjelaskan tentang Infrastruktur Informasi Pertanahan <ol style="list-style-type: none"> 1. <i>Students are able to explain knowledge of land information system concepts</i> 2. <i>Students are able to implement knowledge about information systems to create land applications with GIS</i> 3. <i>Students are able to present and analyze land information systems</i> 4. <i>Students are able to explain about Land Information Infrastructure</i> 																																																		
<p>CPL Prodi yang dibebankan Learning outcomes and their corresponding to PLOs</p>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.4</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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						✓			
	PLO.1	PLO.2	PLO.3	PLO.4	PLO.5	PLO.6	PLO.7	PLO.8	PLO.9																																										
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CLO.4						✓																																													
<p>Mata kuliah wajib prasyarat Mandatory prerequisites</p>	<p style="text-align: center;">-</p>																																																		
<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Pengertian basis data 2. Sistem Pendaftaran Tanah 3. Peta pendaftaran tanah 4. Dasar-dasar Sistem Informasi Pertanahan 5. Infrastruktur Informasi Pertanahan <ol style="list-style-type: none"> 1. <i>Understanding database</i> 2. <i>Land Registration System</i> 3. <i>Land registration map</i> 4. <i>Basics of Land Information Systems</i> 5. <i>Land Information Infrastructure</i> 																																																		

Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1 <i>Assignment 1</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td>25%</td> </tr> <tr> <td>Tugas 2 <i>Assignment 2</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td>25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assignment 1</i>	25%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	25%	Tugas 2 <i>Assignment 2</i>	25%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	25%
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Media yang digunakan <i>Media employed</i>	Classical teaching tools with whiteboard and powerpoint presentation										
Daftar Pustaka <i>Reading list</i>											

12. 3D Kadaster dan BIM / 3D Cadastre and BIM

Nama modul <i>Module name</i>	3D Kadaster dan BIM <i>3D Cadastre and BIM</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235605
Mata kuliah <i>Course</i>	3D Kadaster dan BIM <i>3D Cadastre and BIM</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Dosen <i>Lecturer</i>	Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 Total = 82.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 28 hours</i> <i>Independent activities: 4 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 82.72 hours</i>
Kredit <i>Credits</i>	2 SKS <i>2 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>
Deskripsi Mata Kuliah	<i>Pada mata kuliah ini mahasiswa mempelajari tentang sistem pendaftaran hak milik atas ruang. Penerapan hak kepemilikan rumah susun menjadi fokus mata pelajaran ini, khususnya di Indonesia. Sistem pendaftaran hak atas</i>

<p><i>Description of Course</i></p>	<p><i>ruang yang diterapkan secara luas di beberapa negara juga dipelajari sebagai perbandingan. Mata kuliah ini juga mempelajari tentang perolehan data teknik dan metode yang kemudian divisualisasikan dalam 3 dimensi menggunakan perangkat lunak yang mendukung tersebut. Pemodelan Informasi Geospasial (GIM) menunjukkan metode pemodelan digital dari fenomena terkait ruang angkasa. dari dunia nyata. Hal ini ditandai dengan deskripsi multidimensi fitur geospasial berdasarkan lokasi dan orientasi dalam Sistem Referensi Spasial (SRS), geometri dan topologi raster/vektor, data atribut, dan waktu. Dengan demikian, GIM digunakan sebagai dokumentasi digital keadaan dunia nyata dan dapat diterapkan pada berbagai pertanyaan terkait spasial.</i></p> <p><i>In this course, students learn about the registration system for property rights of space. The implementation of the right of ownership of flats is the focus of this subject, especially in Indonesia. The registration system of right to space which is implemented broadly in several countries is also studied as a comparison. This course also studies data acquisition techniques and methods which are then visualized in 3 dimensions using software that supports this. Geospatial Information Modelling (GIM) denotes the digital modeling method of space-related phenomena. of the real world. It is characterized by multidimensional descriptions of geospatial features by location and orientation in Spatial Reference System (SRS), raster/vector geometry and topology, attribute data, and time. Thus, GIM is used as a digital documentation of real-world states and can be applied to a variety of spatially related questions. Geospatial Information Modeling (GIM) denotes a method of digital modeling of space-related phenomena. from the real world. It is characterized by a multidimensional description of geospatial features based on location and orientation in a Spatial Reference System (SRS), raster/vector geometry and topology, attribute data, and time. Thus, GIM is used as a digital documentation of real world conditions and can be applied to various spatial questions.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu menjelaskan pemodelan semantik dalam BIM 2. Mahasiswa mampu melakukan pemodelan BIM dan geometri termasuk pemodelan detail dan ketelitian

<p><i>Module objectives / Course learning outcomes</i></p>	<ol style="list-style-type: none"> 3. Mahasiswa mampu menjelaskan konsep dan prinsip sistem pendaftaran hak atas ruang (3-D Cadastre). 4. Mahasiswa mampu menjelaskan landasan hukum/peraturan yang berlaku di Indonesia terhadap kegiatan sistem pendaftaran hak atas ruang dan pelaksanaannya. 5. Mahasiswa mampu menjelaskan praktik kadaster 3D terkini di Indonesia dan luar negeri: studi kasus: Kompleks bangunan, Objek infrastruktur bawah permukaan, realisasi infrastruktur geo-Informasi <ol style="list-style-type: none"> 1. <i>Students are able to explain semantic modeling in BIM</i> 2. <i>Students are able to carry out modeling and geometry BIM including modeling details and accuracy.</i> 3. <i>Students are able to explain the concepts and principles of the registration system of rights to space (3-D Cadastre)</i> 4. <i>Students are able to explain the legal/regulatory basis that applies in Indonesia for the activities of the registration system of rights to space and its implementation</i> 5. <i>Students are able to explain the current practice of 3D cadaster in Indonesia and abroad: case studies: Building complex, Subsurface infrastructure objects, realization of geo-Information infrastructure.</i> 																																																												
<p>CPL Prodi yang dibebankan <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="694 1323 1283 1592"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		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							✓			CLO.5						✓	✓		
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Media yang digunakan <i>Media employed</i>												
Classical teaching tools with whiteboard and powerpoint presentation												
Daftar Pustaka <i>Reading list</i>												

13. Pemetaan Bawah Tanah / *Underground Survey*

Nama modul <i>Module name</i>	Pemetaan Bawah Tanah <i>Underground Survey</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235606
Mata kuliah <i>Course</i>	Pemetaan Bawah Tanah <i>Underground Survey</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D.
Dosen <i>Lecturer</i>	Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 Total = 82.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 28 hours</i> <i>Independent activities: 4 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 82.72 hours</i>
Kredit <i>Credits</i>	2 SKS <i>2 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>
Deskripsi Mata Kuliah <i>Description of Course</i>	

<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives / Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu menganalisa pemetaan bawah tanah dengan peralatan terrestrial 2. Mahasiswa mampu menganalisa pemetaan bawah tanah dengan metode fotogrametri 3. Mahasiswa mampu menganalisa pemetaan bawah tanah dengan metode pengikatan dan survey dengan drone bawah tanah <ol style="list-style-type: none"> 1. <i>Students are able to analyze underground mapping with terrestrial equipment</i> 2. <i>Students are able to analyze underground mapping using photogrammetric methods</i> 3. <i>Students are able to analyze underground mapping using the binding method and survey with underground drones</i> 																																								
<p>CPL Prodi yang dibebankan <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 864 1286 1055"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PLO.1	PLO.2	PLO.3	PLO.4	PLO.5	PLO.6	PLO.7	PLO.8	PLO.9	CLO.1				✓						CLO.2					✓					CLO.3						✓			
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<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	<p>-</p>																																								
<p>Pokok Bahasan</p>	<ol style="list-style-type: none"> 1. Metode terestris dalam survey bawah tanah 2. Jenis - jenis infrastruktur underground survey yang ada di Indonesia 3. Strategi dan analisa metode terestris untuk pemetaan bawah tanah khususnya dengan analisa peningkatan dan uitzet 4. Dasar-dasar dan analisa fotogrametri untuk pemetaan bawah tanah 5. Fotogrametri dalam maintanance infrastruktur pemetaan bawah tanah 6. Close range fotogrametri untuk merencanakan dan mengevaluasi struktur bangunan underground survey 7. Laser scanner dan backpack lidar 8. Waterpass untuk studi deformasi underground survey dan fotogrametri 																																								

<p><i>Content</i></p>	<ol style="list-style-type: none"> 1. <i>Terrestrial methods for underground surveying</i> 2. <i>Types of underground survey infrastructure in Indonesia</i> 3. <i>Strategy and analysis of terrestrial methods for underground mapping, especially with improvement and uitzet analysis</i> 4. <i>Basics and analysis of photogrammetry for underground mapping</i> 5. <i>Photogrammetry in underground mapping infrastructure maintenance</i> 6. <i>Close range photogrammetry to plan and evaluate underground survey building structures</i> 7. <i>Laser scanners and backpack lidar for underground survey</i> 8. <i>Waterpass for underground survey and photogrammetry</i> 										
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" data-bbox="711 860 1430 1263"> <thead> <tr> <th data-bbox="711 860 1238 938">Rencana Evaluasi</th> <th data-bbox="1238 860 1430 938">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 938 1238 1016">Tugas 1 <i>Assignment 1</i></td> <td data-bbox="1238 938 1430 1016">25%</td> </tr> <tr> <td data-bbox="711 1016 1238 1095">Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td data-bbox="1238 1016 1430 1095">25%</td> </tr> <tr> <td data-bbox="711 1095 1238 1173">Tugas 2 <i>Assignment 2</i></td> <td data-bbox="1238 1095 1430 1173">25%</td> </tr> <tr> <td data-bbox="711 1173 1238 1263">Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td data-bbox="1238 1173 1430 1263">25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assignment 1</i>	25%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	25%	Tugas 2 <i>Assignment 2</i>	25%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	25%
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<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with whiteboard and powerpoint presentation</p>										
<p>Daftar Pustaka <i>Reading list</i></p>											

14. Sistem Informasi Geografis Lanjut / *Advanced Geographic Information Systems*

Nama modul <i>Module name</i>	Sistem Informasi Geografi Lanjut <i>Advanced Geographic Information Systems</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235701
Mata kuliah <i>Course</i>	Sistem Informasi Geografi Lanjut <i>Advanced Geographic Information Systems</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr. Ing. Ir. Teguh Hariyanto, M.Sc.
Dosen <i>Lecturer</i>	Dr. Ing. Ir. Teguh Hariyanto, M.Sc. Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Matakuliah Pilihan Wajib Bidang Minat untuk Program Master Teknik Geomatika <i>Elective Course (Mandatory for the Chosen Area of Specialist) for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 2.5 jam x 16 minggu per semester <i>Lecture, 2.5 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	Kuliah: 2.5 jam x 14 minggu = 35 jam Penugasan terstruktur: 5 jam x 14 minggu = 70 jam Kegiatan mandiri: 6 jam x 14 minggu = 84 jam Ujian: 2.5 jam x 2 kali = 5 jam Total = 194 jam <i>Lecture: 2.5 hours x 14 weeks = 35 hours</i> <i>Structured exercises and assignments: 5 hours x 14 weeks = 70 hours</i> <i>Independent activities: 6 hours x 14 weeks = 84 hours</i> <i>Exam: 2.5 hours x 2 time = 5 hours</i> <i>Total = 194 hours</i>
Kredit <i>Credits</i>	3 SKS <i>3 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p><i>Module objectives/ Course learning outcomes</i></p>	<p>tentang pemanfaatan teknologi SIG untuk beberapa studi kasus berdasarkan pemahaman tentang prinsip, proses, aplikasi dan pengembangan SIG, serta mengungkapkan ide atau gagasan mereka secara lisan dan tertulis dalam bentuk makalah seminar dan jurnal.</p> <ol style="list-style-type: none"> 2. Mahasiswa mampu mengembangkan dan menerapkan metode dalam spasial modelling baik menggunakan konsep prediksi maupun normative secara sederhana berdasarkan data SIG baik berbasis vector maupun raster berdasarkan berbagai aspek dapat meliputi aspek fisik, sosial, ekonomi, dll. 3. Mahasiswa mampu menerapkan metode MCDA berbasis SIG serta menyusun parameter-parameter yang terlibat dalam penyelesaian studi kasus berdasarkan teknik pembobotan yang tepat seperti ranking, rating atau machine learning, sehingga dapat menganalisis metode yang tepat untuk terapan dalam bidang seperti perencanaan, lingkungan, kebencanaan, ekonomi, pembangunan infrastruktur, dll. <ol style="list-style-type: none"> 1. <i>Students are able to apply statistical and spatial analysis methods in GIS therefore they are able to think critically about the use of GIS technology for several case studies based on an understanding of the principles, processes, applications, and development of GIS, then present the proposed idea by verbal or written in the article of seminar and journal.</i> 2. <i>Students are able to develop and apply methods in spatial modeling using both predictive and normative concepts simply based on GIS data, both vector-based and raster-based on various aspects including physical, social, economic, etc.</i> 3. <i>Students are able to apply the GIS-based MCDA method and compile the parameters involved for accomplishment case studies based on appropriate weighting techniques such as ranking, rating, or machine learning, thus, they can analyze using the suitable method for application in various areas such as planning, environment, disaster, economics, infrastructure development, etc.</i>
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<p>Pokok Bahasan <i>Content</i></p>	<p>Komponen SIG, Data Konversi SIG, Topologi data, Sistem Basis Data Spasial dan non spasial, analisa spasial dan non spasial SIG, pengembangan SIG dan aplikasinya.</p> <p><i>GIS Components, GIS Conversion Data, Data Topology, Spatial and nonspatial Database System, Spatial and nonspatial analysis of GIS, GIS development and application.</i></p>																																								
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15. Analisis Citra Satelit Penginderaan Jauh / *Remote Sensing Satellite Imagery Analysis*

Nama modul <i>Module name</i>	Analisis Citra Satelit Penginderaan Jauh <i>Analysis of Remote Sensing Satellite Imagery</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235702
Mata kuliah <i>Course</i>	Analisis Citra Satelit Penginderaan Jauh <i>Analysis of Remote Sensing Satellite Imagery</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D.
Dosen <i>Lecturer</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS Prof. Lalu Muhamad Jaelani, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Matakuliah Pilihan Wajib Bidang Minat untuk Program Master Teknik Geomatika <i>Elective Course (Mandatory for the Chosen Area of Specialist) for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 2.5 jam x 16 minggu per semester <i>Lecture, 2.5 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	Kuliah: 2.5 jam x 14 minggu = 35 jam Penugasan terstruktur: 5 jam x 14 minggu= 70 jam Kegiatan mandiri: 6 jam x 14 minggu = 84 jam Ujian: 2.5 jam x 2 kali = 5 jam Total = 194 jam <i>Lecture: 2.5 hours x 14 weeks = 35 hours</i> <i>Structured exercises and assignments: 5 hours x 14 weeks = 70 hours</i> <i>Independent activities: 6 hours x 14 weeks = 84 hours</i> <i>Exam: 2.5 hours x 2 time = 5 hours</i> <i>Total = 194 hours</i>
Kredit <i>Credits</i>	3 SKS <i>3 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mahasiswa akan belajar tentang konsep dari parameter radians dan reflektan pada mata kuliah ini. Selain itu, mahasiswa juga akan melakukan koreksi-koreksi yang penting pada pemrosesan data penginderaan jauh seperti koreksi geometrik dan koreksi radiometrik agar dapat merepresentasikan keadaan yang ada di permukaan bumi dengan benar. Sehingga, data citra yang telah terkoreksi tersebut dapat digunakan untuk melakukan proses interpretasi seperti regresi atau klasifikasi secara akurat. Serta, mahasiswa akan belajar menentukan citra apa yang baiknya digunakan pada suatu topik tertentu.</p> <p><i>Students will learn about the basic concept of radiance and reflectance as the product of satellite image in this course. Also, students will conduct important corrections including geometric and radiometric correction to the image such that the corrected image presents the actual condition of the Earth's surface. Therefore, accurate interpretation of satellite image like regression and classification processing can be obtained. Besides that, students will also study on how to select a satellite image which is suitable with a certain topic.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mampu memahami sejarah dan konsep dasar penginderaan jauh dan perkembangan ilmu dan teknologi informasi geospasial mutakhir/terkini di bidang geodesi dan surveying, geodinamik dan lingkungan, geospasial, geomarin, serta pertanian. 2. Memiliki keterampilan dalam memproses data citra penginderaan jauh dan perkembangan ilmu dan teknologi informasi geospasial mutakhir/terkini di bidang geodesi dan surveying, geodinamik dan lingkungan, geospasial, geomarin, serta pertanian. 3. Memiliki keterampilan dalam memproses kalibrasi radiometrik, koreksi geometrik dan perkembangan ilmu dan teknologi informasi geospasial mutakhir/terkini di bidang geodesi dan surveying, geodinamik dan lingkungan, geospasial, geomarin, serta pertanian. 4. Mampu melakukan interpretasi dan klasifikasi citra satelit dan perkembangan ilmu dan teknologi informasi geospasial mutakhir/terkini di bidang geodesi dan surveying, geodinamik dan lingkungan, geospasial, geomarin, serta pertanian.

<i>Module objectives/ Course learning outcomes</i>	<ol style="list-style-type: none"> 1. <i>Able to understand the history and basic concepts of remote sensing and the development of cutting-edge/up-to-date geospatial information science and technology in the fields of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land.</i> 2. <i>Have skills in processing remote sensing image data and the development of state-of-the-art geospatial information science and technology in the fields of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land.</i> 3. <i>Have skills in processing remote sensing image data and the development of state-of-the-art geospatial information science and technology in the fields of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land.</i> 4. <i>Able to interpret and classify satellite imagery and the development of the latest /latest geospatial information science and technology in the field of geodesy and surveying, geodynamics and environment, geospatial, geomarin, and land.</i> 																																																		
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Pokok Bahasan <i>Content</i>	<p>Pengertian Dasar, Landasan Interpretasi, Kunci Interpretasi, Macam, Cara/Metode, Proses, Alat, Data/Dokumen Interpretasi. Peralatan dasar Penginderaan Jauh (pengolahan citra) untuk menghitung dan menginterpretasi citra satelit. kegiatan informasi geospasial metode Penginderaan Jauh dengan membuat persyaratan pekerjaan, membuat orbit satelit. aplikasi citra satelit penginderaan jauh.</p> <p><i>Basic Understanding, Foundation of Interpretation, Key to Interpretation, type, Methods/Methods, Processes, Tools, Data/Interpretation Documents. Basic Remote Sensing (image processing) equipment for calculating and interpreting satellite imagery. geospatial information activities of remote sensing methods by</i></p>																																																		

	<i>creating work requirements, creating satellite orbits. remote sensing satellite imagery application.</i>										
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<i>the examination regulations</i>	<i>the exams</i>
<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mata kuliah ini membahas tentang konsep dan metode pemetaan dengan Teknik fotogrametri. Topik dimulai dengan konsep dan sejarah fotogrametri yang meliputi latar belakang teori, metode akuisisi data, dan pengolahan data. Metode pengolahan data dalam fotogrametri saat ini telah berkembang ke arah fotogrametri digital yang meliputi kalibrasi kamera, orientasi relative, orientasi absolut dan penyesuaian bundel. Metode terbaru lainnya dalam fotogrametri juga dibahas dalam mata kuliah ini, terutama terkait dengan bidang lain seperti pencocokan citra digital, struktur dari pergerakan, dan klasifikasi citra digital. Mata kuliah ini juga membahas tentang penerapan Teknik fotogrametri untuk berbagai kebutuhan dalam masalah lingkungan, pemukiman manusia, serta pemodelan 3D. Mata kuliah ini diajarkan di ruang kelas dan laboratorium yang memungkinkan mahasiswa memiliki banyak pengalaman dalam penerapan fotogrametri.</p> <p><i>This course discusses about the concept and method of mapping with photogrammetric techniques. The topics start with the concept and history of photogrammetry which includes theoretical background, data acquisition method, and data processing. The data processing methods in photogrammetry nowadays have been developed towards digital photogrammetry which includes camera calibration, relative orientation, absolute orientation and bundle adjustment. Other recent methods in photogrammetry are also discussed in this course, especially related to other fields such as digital image matching, structure from motion, and digital image classification. This course also discuss about application of photogrammetric techniques for various needs in environment problem, human settlements, and also 3D modeling. The course is conducted in classroom and laboratory which allows students having much experiences in the application of photogrammetry.</i></p>

<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu menjelaskan konsep fisika elektro optikal digital (CCD/CMOS), kamera metrik dan non metrik digital dan peralatan lainnya beserta model matematis untuk kalibrasi dan koreksinya. 2. Mahasiswa mampu menjelaskan model konsep digital secara teoritis dan empiris dalam perhitungan fotogrametri tiga dimensi dengan data photo udara digital mono dan stereo. 3. Mahasiswa mampu menerapkan konsep fotogrametri digital workstation dalam penyelesaian proses orientasi digital dalam bentuk model matematis 3D antara koordinat photo dan koordinat obyek (tanah) untuk mendapatkan detail planimetris dan tinggi. 4. Mahasiswa mampu mengetahui dan menerapkan penenalan obyek secara digital dalam rangka interpretasi obyek berbasis area, dan pixel. 5. Mahasiswa mampu mengetahui dan menerapkan konsep Teknologi LIDAR untuk mendapatkan DEM, DSM dan kontur.
<p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. <i>Students are able to explain the concepts of digital electro-optical physics (CCD/CMOS), digital metric and non-metric cameras and other equipment along with mathematical models for calibration and correction.</i> 2. <i>Students are able to explain theoretically and empirically digital concept models in three-dimensional photogrammetry calculations with mono and stereo digital aerial photo data.</i> 3. <i>Students are able to apply the concept of digital photogrammetry workstation in completing the digital orientation process in the form of a 3D mathematical model between photo coordinates and object coordinates (ground) to obtain planimetric and height details.</i> 4. <i>Students are able to know and apply object recognition digitally in the context of area and pixel-based object interpretation.</i> 5. <i>Students are able to know and apply the concept of LIDAR Technology to obtain DEM, DSM and contours.</i>

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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Metode fotogrametri: definisi, sejarah, optik, pengukuran dan interpretasi. 2. Proses fotogrametri: perhitungan dasar dalam citra vertikal dan miring, sistem koordinat, transformasi koordinat, kalibrasi kamera 3. Fotogrametri digital: citra digital, persamaan kolinearitas, orientasi interior dan eksterior 4. Teknik fotogrametri terkini: kamera format kecil, fotogrametri jarak dekat, Structure from Motion (SFM) <ol style="list-style-type: none"> 1. <i>Method of photogrammetry: definition, history, optics, measurement and interpretation.</i> 2. <i>Photogrammetric process: basic computations in vertical and oblique imagery, coordinate systems, coordinate transformation, camera calibration</i> 3. <i>Digital photogrammetry: digital imagery, collinearity equation, interior and exterior orientation</i> 4. <i>Recent photogrammetric techniques: small format camera, close range photogrammetry, Structure from Motion (SFM)</i> 																																																												
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Studi kasus <i>Case Method</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Middle Term Examination</i></td> <td>25%</td> </tr> <tr> <td>Hasil Project <i>Team-Base Project</i></td> <td>30%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Examination</i></td> <td>20%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Studi kasus <i>Case Method</i>	25%	Evaluasi Tengah Semester <i>Middle Term Examination</i>	25%	Hasil Project <i>Team-Base Project</i>	30%	Evaluasi Akhir Semester <i>Final Examination</i>	20%																																																		
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<p>Daftar Pustaka <i>Reading list</i></p>	<p>Principal :</p> <ol style="list-style-type: none"> 1. Mikhail, Bethel, McGlone. 2005. <i>Introduction to Modern Photogrammetry</i>, John Willey & Sons. 2. Wolf, PR & Dewitt,BA. <i>Elements of Photogrammetry with Appl. in GIS</i>, 2004, McGraw-Hill. 3. Kraus K., <i>Photogrammetry</i>, Vol 1 and 2. 4th rev. ed, Ferd. Dümmlers Verlag, 1993 <p>Supplementary :</p> <ol style="list-style-type: none"> 1. Sandau, R. 2010. <i>Digital Airborne Camera Introduction and Technology</i>, Springer. 2. Teguh Hariyanto. 2006. <i>Modul Ajar Fotogrametri</i>, Teknik Geodesi – FTSP, ITS

<p><i>Module objectives/ Course learning outcomes</i></p>	<p>4. Mampu memahami kegiatan informasi geospasial metode penginderaan jauh.</p> <p>1. <i>Able to understand the basic concept of the platform, the basic principles, physics of electromagnetic waves, propagation media, and the geometrics of satellites.</i></p> <p>2. <i>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.</i></p> <p>3. <i>Able to understand image processing for calculating and interpreting satellite imagery.</i></p> <p>4. <i>Able to understand geospatial information activities of remote sensing methods.</i></p>																																																		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<p>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).</p> <p>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.</p> <p>3. Melaporkan hasil eksperimen dan hasil analisis secara tertulis dan lisan dengan bekerja secara mandiri dan bersama-sama dalam tim.</p> <p>1. <i>Basic concepts of historical platform, basic principles, physics of electromagnetic waves, rides of transporters, geometric satellites. Image types and</i></p>																																																		

	<p><i>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).</i></p> <p>2. <i>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.</i></p> <p>3. <i>Reporting experimental results and analytical results in writing and orally by working independently and together in teams.</i></p>											
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th data-bbox="711 775 1275 857">Rencana Evaluasi</th> <th data-bbox="1275 775 1447 857">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 857 1275 938">Kognitif - Tugas Cognitive - Assigment</td> <td data-bbox="1275 857 1447 938">20%</td> </tr> <tr> <td data-bbox="711 938 1275 1019">Hasil proyek Team - based Project</td> <td data-bbox="1275 938 1447 1019">20%</td> </tr> <tr> <td data-bbox="711 1019 1275 1099">Kognitif - UTS Caognitive - Midterm Exam</td> <td data-bbox="1275 1019 1447 1099">30%</td> </tr> <tr> <td data-bbox="711 1099 1275 1189">Kognitif - UAS Cognitive - Final Exam</td> <td data-bbox="1275 1099 1447 1189">30%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Kognitif - Tugas Cognitive - Assigment	20%	Hasil proyek Team - based Project	20%	Kognitif - UTS Caognitive - Midterm Exam	30%	Kognitif - UAS Cognitive - Final Exam	30%	
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<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 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. 											

18. Sosio Ekonomi Spasial / *Spatial Socio-Economic*

Nama modul <i>Module name</i>	Sosio Ekonomi Spasial <i>Socio Economic Spatial</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235705
Mata kuliah <i>Course</i>	Sosio Ekonomi Spasial <i>Socio Economic Spatial</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS
Dosen <i>Lecturer</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

	<p>3. <i>Able to understand the definition of Geospatial, the scope of Geospatial Information related to Social.</i></p> <p>4. <i>Able to understand the Utilization of Geospatial Information in Various Fields.</i></p>																																																		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Konsep dasar sosial ekonomi Tata ruang yang merupakan disiplin ilmu yang membahas tentang kejadian/fenomena lingkungan yang dipengaruhi oleh proses alam, bagaimana masyarakat menghasilkan organisasi dan memanfaatkan lingkungan, dan bagaimana kondisi masyarakat itu sendiri yang dipengaruhi oleh lingkungan dimana masyarakat itu berada 2. Kontribusi sosial ekonomi Tata ruang adalah fokus pada ruang dan lingkungan sebagai prinsip dasar yang dipelajari. 3. Sosio-ekonomi Negara-negara spasial harus memperhatikan objek utama yang menyangkut muka bumi daripada ruang abstrak; fokus pada aspek spasial kehidupan dan lingkungan dan hubungan timbal balik mereka. peka terhadap sumber daya, variasi dan distribusi di bumi. <ol style="list-style-type: none"> 1. <i>The basic concept of socio-economic Spatial which is a discipline that discusses the events / phenomena of the environment that is influenced by natural processes, how society produces the organization and utilize the environment, and how the condition of society itself that is influenced by the environment where the society is located</i> 2. <i>The contribution of socio-economic Spatial is the focus on space and environment as the basic principles learned.</i> 3. <i>Socio-economic Spatial states must care about the main object concerning the face of the earth rather than abstract space; focus on the spatial aspects of life and the environment and their reciprocal relationships. sensitive to resources, variations and distribution on earth.</i> 																																																		

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<p>Deskripsi Mata Kuliah</p>	<p>Pada mata kuliah ini mahasiswa akan mempelajari tentang teori dasar dan komponen perencanaan wilayah untuk pemanfaatannya lebih lanjut. Metode pengumpulan menggunakan berbagai tipe data dari area perencanaan skala yang berbeda dibahas dalam kuliah dan tugas. Dengan demikian, mahasiswa mampu memiliki pengalaman mengumpulkan dan membuat berbagai tipe data untuk perencanaan wilayah. Mata kuliah ini juga berkaitan dengan perencanaan daerah di era otonomi yang terdiri dari tahapan perencanaan daerah, perencanaan sumber daya, tata cara perencanaan di era otonomi dan berbagai pemecahan masalah bagi pelaksanaan perencanaan pembangunan daerah. Selain itu, pemanfaatan data spasial dan nonspasial akan disajikan sebagai studi kasus. Sehingga mahasiswa dapat lebih memahami jenis-jenis topologi dalam perencanaan wilayah dengan mengembangkan Analisa data menggunakan teknologi SIG. Pada akhirnya, mahasiswa mampu memiliki pengalaman berpikir kritis dalam pemanfaatan dan pengembangan teknologi informasi di berbagai bidang yang berkaitan dengan perencanaan wilayah dan pembangunan infrastruktur.</p>
<p><i>Description of Course</i></p>	<p><i>In this course, students will study about the basic theory and components of regional planning for its further utilization. The methods for collecting various data types from different scale planning area are discussed in lecture and assignments. Thereby, students are able to possess experiences of collecting and creating various data types for regional planning. The course also concerning with regional planning in the era of autonomy which consists of the stages of regional development planning, resources planning, planning procedures in the era of autonomy and various problems solving for the implementation of regional development planning. Moreover, spatial and nonspatial data utilization will be presented as a case study. Such that, students able to further understand the topology types in regional planning by developing data analysis using GIS technology. Eventually, students are able to possess experiences of thinking critically in term of the utilization and development of information technology in several fields related to regional planning and infrastructure development.</i></p>

<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa dapat memahami dan mengerti tentang konsep dan aturan perencanaan wilayah, komponen dan penerapannya. 2. Mahasiswa mengetahui serta memahami proses dan parameter dalam penyusunan perencanaan wilayah detail, semi detail dan global. 3. Mahasiswa mengerti manfaat dari metoda dalam perencanaan wilayah serta bidang lain yang terkait. 4. Mahasiswa memahami dan mampu dalam mengaplikasikan metoda SIG untuk perencanaan wilayah dalam rangka menganalisis hasil wilayah permukiman, industri dan kawasan lindung. <p><i>1. Students can understand and understand the concepts and rules of regional planning, components, and their application.</i></p> <p><i>2. Students know and understand the processes and parameters in the preparation of detailed, semi-detailed, and global regional planning.</i></p> <p><i>3. Students understand the benefits of methods in regional planning and other related fields.</i></p> <p><i>4. Students understand and are able to apply GIS methods for regional planning in order to analyze the results of residential, industrial and protected areas.</i></p>																																																		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<p>Pengertian, komponen dan jenis data perencanaan daerah, perencanaan daerah dalam era otonomi, pokok-pokok perencanaan pembangunan daerah, tahapan perencanaan pembangunan, sumber daya perencanaan daerah, tata cara pelaksanaan perencanaan dan pemecahan masalah, strategi pembangunan fundamental ekonomi daerah, ciri dan proses dari penyusunan rencana yang komprehensif.</p> <p><i>Definition, component and regional planning data types, regional planning in the era of autonomy, the principal of regional development planning, development planning stages, regional planning resources, the implementation of planning procedures and solving</i></p>																																																		

	<i>problems, regional economic fundamentals development strategy, characteristics and process of the compilation of comprehensive plans.</i>										
Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas <i>Cognitive Assignment</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Middle Term Examination</i></td> <td>25%</td> </tr> <tr> <td>Hasil Proyek <i>Team Based Project</i></td> <td>25%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Examination</i></td> <td>25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas <i>Cognitive Assignment</i>	25%	Evaluasi Tengah Semester <i>Middle Term Examination</i>	25%	Hasil Proyek <i>Team Based Project</i>	25%	Evaluasi Akhir Semester <i>Final Examination</i>	25%
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Hasil Proyek <i>Team Based Project</i>	25%										
Evaluasi Akhir Semester <i>Final Examination</i>	25%										
Media yang digunakan <i>Media employed</i>	Classical teaching tools with white board and powerpoint presentation										
Daftar Pustaka <i>Reading list</i>	<ol style="list-style-type: none"> 1. Achmad D,2012 ,<i>Proses Perencanaan Wilayah dan Kota, Gajah Mada Univesiti Press, Yogyakarta</i> 2. Burrough, P.A, 1996. "Principles of Geographical Information System For Land Resources Assessment". <i>Oxford University Press Inc, New York</i> 3. Mudrajad,K,2004,<i>Otonomi dan Pembangunan Daerah, Penerbit Erlangga, Jakarta.</i> 4. Siti.S.N, 2002, <i>Perencanaan Wilayah di Indonesia pada masa sekitar krisis,Penerbit ITB,Bandung.</i> 										

20. Kartografi dan Geovisualisasi / *Cartography and Geovisualization*

Nama modul <i>Module name</i>	Kartografi dan Geovisualisasi <i>Cartography and Geovisualization</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235707
Mata kuliah <i>Course</i>	Kartografi dan Geovisualisasi <i>Cartography and Geovisualization</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr.-Ing. Noorlaila Hayati, S.T., M.T.
Dosen <i>Lecturer</i>	Dr. Ing. Ir. Teguh Hariyanto, M.Sc. Dr.-Ing. Noorlaila Hayati, S.T., M.T.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Matakuliah Pilihan untuk Program Master Teknik Geomatika <i>Elective Course for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	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 Total = 82.72 jam <i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 4 hours x 14 weeks = 28 hours</i> <i>Independent activities: 4 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Total = 82.72 hours</i>
Kredit <i>Credits</i>	2 SKS <i>2 credits</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Pada mata kuliah ini mahasiswa akan mempelajari tentang konsep Kartografi yang meliputi pengertian Peta dan sejarah peta. Pengertian peta yang dimaksud adalah arti peta, penggolongan peta menurut sifat, macam dan jenisnya. Setelah mengetahui arti peta, maka prosedur pembuatan peta diajarkan yaitu proses pemetaan yang terdiri dari: pengambilan data, pengolahan data dan penyajian data. Selanjutnya, mahasiswa akan mempelajari dan menelaah perkembangan kartografi dalam teknologi saat ini yang biasa disebut sebagai pemetaan digital. Mahasiswa diharapkan dapat mengimplementasikan peta dasar dan peta tematik dalam produk dokumen digital dan dapat divisualisasikan secara interaktif via online.</p> <p><i>In this course, students will learn the concept of Cartography such as the understanding of maps and the history of maps. It includes the meaning of the map, the classification of maps, and the types of maps. Furthermore, students learn the procedure for making maps, namely the mapping process which consists of data collection, data processing, and data presentation. Furthermore, students will study and examine the development of cartography in today's technology which is commonly referred to as digital mapping. Students are expected to be able to implement base maps and thematic maps in digital document products and can be visualized interactively using the internet.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mampu menjelaskan konsep tentang Kartografi, meliputi arti peta, posisi suatu tempat dan tujuan kartografi. 2. Mampu membedakan peta yang beredar di masyarakat. 3. Mampu menjelaskan prosedur pembuatan peta secara complex. 4. Mampu membuat peta tematik dari serangkaian data yang tersedia (data sekunder). 5. Mampu menjelaskan analitik dan otomatisasi kartografi. 6. Mampu memahami konsep peta tematik dalam 2D dan 3D. 7. Mampu menjelaskan aplikasi pemetaan digital beserta cara visualisasinya. 8. Mampu memahami perkembangan mutakhir teknologi pemetaan digital.

<p><i>Module objectives/Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. <i>Able to explain the concept of cartography including the meaning of maps, the position of a place and the purpose of cartography.</i> 2. <i>Able to distinguish maps circulating in the community.</i> 3. <i>Able to explain the procedure of making a map in a complex term.</i> 4. <i>Able to create thematic maps from a set of available data (secondary data).</i> 5. <i>Able to explain cartographic analytics and automatic cartography.,</i> 6. <i>Able to understand the concept of thematic maps in 2D and 3D.</i> 7. <i>Able to explain digital mapping applications and how to visualize them.</i> 8. <i>Able to understand the latest developments in digital mapping technology.</i> 																																																																																										
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 857 1283 1245"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.8</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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					✓					CLO.5						✓				CLO.6					✓					CLO.7					✓					CLO.8					✓				
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<p>Pokok Bahasan <i>Content</i></p>	<p>Konsep Kartograf, penggolongan peta, prosedur pembuatan peta, pemahaman tentang skala, system koordinat, plotting Koordinat: pengertian koordinat kartesian, geografis, sistem koordinat, desain tata letak pada peta.</p> <p><i>Cartographic concept, map classification, mapmaking procedure, understanding of scale, coordinate system, coordinate plotting, cartesian coordinate definition, geographic, coordinate system, layout design on map.</i></p>																																																																																										

Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Pembuatan peta dasar Making a base map</td> <td>15%</td> </tr> <tr> <td>Pembuatan peta tematik Making a thematic map</td> <td>10%</td> </tr> <tr> <td>Evaluasi Tengah Semester Mid Term Exam</td> <td>20%</td> </tr> <tr> <td>Pembuatan webmapping Making webmapping</td> <td>25%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Examination</i></td> <td>30%</td> </tr> </tbody> </table>		Rencana Evaluasi	Bobot Weight	Pembuatan peta dasar Making a base map	15%	Pembuatan peta tematik Making a thematic map	10%	Evaluasi Tengah Semester Mid Term Exam	20%	Pembuatan webmapping Making webmapping	25%	Evaluasi Akhir Semester <i>Final Examination</i>	30%
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Media yang digunakan <i>Media employed</i>	Classical teaching tools with white board and power point presentation													
Daftar Pustaka <i>Reading list</i>	<ol style="list-style-type: none"> 1. Villanueva, K.J. 1984. <i>Kartografi</i>. Jurusan Teknik Geodesi FTSP ITB. Bandung. 2. Wolf, Paul, R. 1974. <i>Elementary of Photogrametry</i> 3. Kraak, MJ., Omerling, J. 1996. <i>Cartography Petzation of spatial data</i>. Prentice Hall. London 4. Yuwono, 2009. <i>Kartografi</i>. Prodi teknik Geomatika ITS. 2009. Surabaya 													

21. Pengelolaan Infrastruktur Informasi Geospasial / *Geospatial Information Infrastructure Management*

Nama modul <i>Module name</i>	Pengelolaan Infrastruktur Informasi Geospasial <i>Management of Geospatial Information Infrastructure</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235708
Mata kuliah <i>Course</i>	Pengelolaan Infrastruktur Informasi Geospasial <i>Management of Geospatial Information Infrastructure</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS
Dosen <i>Lecturer</i>	Prof. Dr. Ir. Bangun Muljo Sukojo, DEA.DESS
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i></p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian	Minimum 80% kehadiran untuk mengikuti ujian tertulis

<i>Requirements according to the examination regulations</i>	<i>Minimum 80% attendance in this course in order to take the exams</i>
Deskripsi Mata Kuliah <i>Description of Course</i>	<p>Mata kuliah ini berisikan materi tentang konsep dasar Pengelolaan Infrastruktur Informasi Geospasial (IIG). Peran teknik geomatika dalam mendesain, membangun, mengelola dan mengembangkan IIG. Dalam peran IIG di Indonesia, terkait berbagi-pakai serta tukar guna data dan informasi geospasial dalam rangka menanggapi permasalahan dan isu terkait IIG.</p> <p><i>This course contains material on the basic concepts of Geospatial Information Infrastructure Management (IIG). The role of geomatics engineering in designing, building, managing, and developing IIG. In the role of IIG in Indonesia, related to sharing and exchanging for geospatial data and information in order to respond to problems and issues related to IIG.</i></p>
Capaian Pembelajaran / Course Learning Outcomes <i>Module objectives/ Course learning outcomes</i>	<ol style="list-style-type: none">1. Mampu menjelaskan kebutuhan data dan informasi geospasial dalam Infrastruktur Informasi Geospasial (IIG).2. Mampu menjelaskan konsep metadata, interoperabilitas dan katalog fitur.3. Mampu membuat desain geoportal.4. Mampu menjelaskan konsep dan metode evaluasi Infrastruktur Informasi Geospasial (IIG) dan geoportal.5. Mampu menjelaskan isu pemanfaatan sumberdaya alam versus pelestarian lingkungan. <p><i>1. Able to explain the needs of geospatial data and information in the Geospatial Information Infrastructure (IIG).</i></p> <p><i>2. Able to explain the concept of metadata, interoperability, and catalog features.</i></p> <p><i>3. Able to create geoportal design.</i></p> <p><i>4. Able to explain the concepts and methods of evaluation of Geospatial Information Infrastructure (IIG) and geoportal.</i></p> <p><i>5. Able to explain the issue of natural resource utilization versus environmental conservation.</i></p>

<p>CPL Prodi yang dibebankan <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		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			✓	✓			✓			CLO.5										CLO.6			✓	✓			✓		
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> 1. Konsep dan komponen penyusun Infrastruktur Informasi Geospasial (IIG) 2. Kebutuhan data dan informasi geospasial dalam Infrastruktur Informasi Geospasial (IIG) 3. Konsep metadata, interoperabilitas dan katalog fitur 4. Pembuatan desain geoportal 5. Konsep dan metode evaluasi Infrastruktur Informasi Geospasial (IIG) dan geoportal 6. Isu pemanfaatan sumberdaya alam versus pelestarian lingkungan <ol style="list-style-type: none"> 1. <i>Concept and components of geospatial information infrastructure</i> 2. <i>Geospatial data and information requirement in geospatial information infrastructure</i> 3. <i>Concept of metadata, interoperability, and feature catalog</i> 4. <i>Geoportal design</i> 5. <i>Concept and method for evaluation in geospatial information infrastructure</i> 6. <i>Utilization against preservation of natural resources issue</i> 																																																																						
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Studi Kasus 1 <i>Case Method 1</i></td> <td>20%</td> </tr> <tr> <td>Studi Kasus 1 <i>Case Method 1</i></td> <td>20%</td> </tr> <tr> <td>Tugas Assignment</td> <td>20%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Middle Term Examination</i></td> <td>10%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Examination</i></td> <td>30%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Studi Kasus 1 <i>Case Method 1</i>	20%	Studi Kasus 1 <i>Case Method 1</i>	20%	Tugas Assignment	20%	Evaluasi Tengah Semester <i>Middle Term Examination</i>	10%	Evaluasi Akhir Semester <i>Final Examination</i>	30%																																																										
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<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with whiteboard and powerpoint presentation</p>
<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Sukojo, B.M., 2017, Pengantar Informasi Geospasial, ITS, Surabaya. 2. Schade, S. et al. (2020). Geospatial Information Infrastructures. In: Guo, H., Goodchild, M.F., Annoni, A. (eds) Manual of Digital Earth. Springer, Singapore. 3. Williamson, I.P., Rajabifard, I., and Feeney, M.F., 2003, Developing Spatial Data Infrastructures From Concept to Reality, CRC Press, New York. 4. Groot, R., and McLaughlin, J.D., 2000, Geospatial Data Infrastructure Concepts, Cases and Good Practice, NHBS, USA.

22. Penginderaan Jauh Sistem Aktif / *Active System Remote Sensing*

Nama modul <i>Module name</i>	Penginderaan Jauh Sistem Aktif <i>Active System Remote Sensing</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235709
Mata kuliah <i>Course</i>	Penginderaan Jauh Sistem Aktif <i>Active System Remote Sensing</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Dr.-Ing. Noorlaila Hayati, S.T., M.T.
Dosen <i>Lecturer</i>	Dr.-Ing. Noorlaila Hayati, S.T., M.T.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i></p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

Deskripsi Mata Kuliah <i>Description of Course</i>																																																			
Capaian Pembelajaran / Course Learning Outcomes <i>Module objectives/ Course learning outcomes</i>	<ol style="list-style-type: none"> 1. Mahasiswa memiliki pengetahuan tentang konsep dan aplikasi Radar untuk pemetaan 2. Mahasiswa memiliki pengetahuan tentang dasar teori dan metode pengolahan citra Radar 3. Mahasiswa mampu melakukan analisa citra Radar dengan menggunakan citra SAR dan teknik Interferometri untuk akuisisi data spasial 4. Mahasiswa mampu memanfaatkan teknologi penginderaan aktif (Radar) untuk pengelolaan sumber daya alam dan mitigasi bencana <ol style="list-style-type: none"> 1. <i>Students have knowledge of Radar concepts and applications for mapping</i> 2. <i>Students have knowledge of the basic theory and methods of Radar image processing</i> 3. <i>Students are able to analyze Radar images using SAR images and Interferometry techniques for spatial data acquisition</i> 4. <i>Students are able to utilize active sensing technology (Radar) for natural resource management and disaster mitigation</i> 																																																		
CPL Prodi yang dibebankan <i>Learning outcomes and their corresponding to PLOs</i>	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <th>CLO.1</th> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.2</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">✓</td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.3</th> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CLO.4</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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						✓			
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Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i>	-																																																		
Pokok Bahasan	<ol style="list-style-type: none"> 1. Pengertian dasar Radar. Konsep Penginderaan Jauh Aktif Citra Radar. 2. Gelombang elektromagnetik microwave Phase, Amplitudo dan Panjang Gelombang. Radar Conventions, Microwave spectrum dan band Propagation. 3. Sigma nought, backscattering, volume scattering, polarisasi 4. Aplikasi backscattering SAR 5. RAR dan SAR, Proses dan Cara Kerja SAR, SAR Geometri dan Parameternya 6. Proses InSAR 																																																		

<p><i>Content</i></p>	<ol style="list-style-type: none"> 1. <i>Basic understanding of Radar. Radar Image Active Remote Sensing Concept.</i> 2. <i>Microwave electromagnetic waves Phase, Amplitude and Wavelength. Radar Conventions, Microwave spectrum and Propagation bands.</i> 3. <i>Sigma nought, backscattering, volume scattering, polarization</i> 4. <i>SAR backscattering application</i> 5. <i>RAR and SAR, Process and How SAR Works, SAR Geometry and Parameters</i> 6. <i>InSAR processing</i> 										
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" data-bbox="711 689 1430 1093"> <thead> <tr> <th data-bbox="711 689 1238 770">Rencana Evaluasi</th> <th data-bbox="1238 689 1430 770">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 770 1238 851">Tugas SAR SAR Assignment</td> <td data-bbox="1238 770 1430 851">25%</td> </tr> <tr> <td data-bbox="711 851 1238 931">Evaluasi Tengah Semester <i>Middle Term Examination</i></td> <td data-bbox="1238 851 1430 931">25%</td> </tr> <tr> <td data-bbox="711 931 1238 1012">Tugas InSAR <i>InSAR Assignment</i></td> <td data-bbox="1238 931 1430 1012">25%</td> </tr> <tr> <td data-bbox="711 1012 1238 1093">Evaluasi Akhir Semester <i>Final Examination</i></td> <td data-bbox="1238 1012 1430 1093">25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas SAR SAR Assignment	25%	Evaluasi Tengah Semester <i>Middle Term Examination</i>	25%	Tugas InSAR <i>InSAR Assignment</i>	25%	Evaluasi Akhir Semester <i>Final Examination</i>	25%
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Evaluasi Akhir Semester <i>Final Examination</i>	25%										
<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with whiteboard and powerpoint presentation</p>										
<p>Daftar Pustaka <i>Reading list</i></p>											

23. 3D Model / 3D Model

Nama modul <i>Module name</i>	3D Model <i>3D Model</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235710
Mata kuliah <i>Course</i>	3D Model <i>3D Model</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Dosen <i>Lecturer</i>	Hepi Hapsari Handayani, S.T., M.Sc., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i></p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i>	Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i>

<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Geoinformasi tiga dimensi adalah data yang menggambarkan fitur geografis dalam ruang 3D dengan himpunan koordinat (x, y, z). Definisi ini meliputi luas tentang berbagai bentuk data, seperti space dalam ruang 3D, model elevasi digital (DEM), dan model bangunan serta kota 3D. Metodologi utama dalam ikhtisar ini adalah tinjauan literatur dan sintesis. Kuliah mencakup literatur ilmiah, laporan proyek, serta sumber lain tentang ilmu geoinformasi 3D dengan fokus pada pemanfaatan model kota 3D secara komprehensif dan sistematis.</p> <p><i>Three-dimensional geoinformation is data that describes geographic features in 3D space with a set of (x, y, z) coordinates. This general definition results in encompassing a broad notion of different forms of data, such as movement trajectories in 3D space, digital elevation models (DEMs), and 3D models of building and cities. The main methodology in this overview is a literature review and a synthesis. We have screened scientific literature, project reports as well and online resources on 3D geoinformation science with a focus on the utilization of 3D city models in a comprehensive and systematic manner.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu memahami tipe tipe model bangunan yang terdapat dalam kawasan kota, kabupaten kota, kota, wilayah 2. Mahasiswa mampu membedakan tingkat level of details bangunan sesuai dengan karektiristik bangunan dan tujuan penggunaan 3. Mahasiswa mampu mengembangkan ide penerapan 3D model bangunan dalam aplikasi untuk perencanaan kota, mitigasi bencana, penataan lingkungan, dll 4. Mahasiswa mampu melakukan satu metode rekontruksi bangunan untuk membentuk 3D model bangunan atau kota dalam scope kecil <p><i>1. Students are able to understand the types of building models found in city areas, city districts, cities, regions.</i></p> <p><i>2. Students can differentiate the level of detail of buildings according to building characteristics and intended use.</i></p> <p><i>3. Students are able to develop ideas for applying 3D building models in applications for urban planning, disaster mitigation, environmental planning, etc.</i></p>

	4. <i>Students are able to carry out a building reconstruction method to form a 3D model of a building or city within a small scope</i>																																																		
CPL Prodi yang dibebankan <i>Learning outcomes and their corresponding to PLOs</i>	<table border="1"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table>		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							✓		
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Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i>	-																																																		
Pokok Bahasan <i>Content</i>	<ol style="list-style-type: none"> 1. Tipe tipe model bangunan yang terdapat dalam kawasan kota, kabupaten kota, kota, wilayah 2. Tingkat level of details bangunan sesuai dengan karektistik bangunan dan tujuan penggunaan. 3. Ide penerapan 3D model bangunan dalam aplikasi untuk perencanaan kota, mitigasi bencana, penataan lingkungan, dll 4. Metode rekontruksi bangunan untuk membentuk 3D model bangunan atau kota dalam scope kecil <ol style="list-style-type: none"> 1. <i>The types of building models found in city areas, city districts, cities, regions.</i> 2. <i>The level of detail of buildings according to building characteristics and intended use.</i> 3. <i>Ideas for applying 3D building models in applications for urban planning, disaster mitigation, environmental planning, etc.</i> 4. <i>Building reconstruction method to form a 3D model of a building or city within a small scope.</i> 																																																		
Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1"> <thead> <tr> <th>Rencana Evaluasi</th> <th>Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas <i>Assignment</i></td> <td>20%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Middle Term Examination</i></td> <td>25%</td> </tr> <tr> <td>Project <i>Project</i></td> <td>25%</td> </tr> <tr> <td>Final Project <i>Final Project</i></td> <td>30%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas <i>Assignment</i>	20%	Evaluasi Tengah Semester <i>Middle Term Examination</i>	25%	Project <i>Project</i>	25%	Final Project <i>Final Project</i>	30%																																								
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Media yang digunakan <i>Media employed</i>	Classical teaching tools with whiteboard and powerpoint presentation																																																		

Daftar Pustaka <i>Reading list</i>	
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<p><i>Module objectives/ course learning outcomes</i></p>	<ol style="list-style-type: none"> 2. Mahasiswa memahami aspek teknis instrumen akustik bawah air dan gerak kapal 3. Mahasiswa mampu mendeskripsikan propagasi gelombang suara di kolom air 4. Mahasiswa mampu memahami konsep dan menghitung cepat rambat gelombang suara di kolom air 5. Mahasiswa mengetahui faktor-faktor yang mempengaruhi propagasi gelombang suara di kolom air 6. Mahasiswa mengenal konsep Multispektral Multibeam Echosounder 7. Mahasiswa mampu menjelaskan mengenai pasang surut dan pengaruhnya terhadap survei hidrografi 8. Mahasiswa mengetahui mengenai Underwater Acoustic Positioning beserta aplikasinya <ol style="list-style-type: none"> 1. <i>Students are able to know the concept and application of hydrographic survey</i> 2. <i>Students understand the technical aspects of underwater acoustic instruments and ship motion</i> 3. <i>Students are able to describe the propagation of sound waves in the water column</i> 4. <i>Students are able to understand the concept and calculate the speed of sound waves in the water column</i> 5. <i>Students know the factors that affect the propagation of sound waves in the water column</i> 6. <i>Students are familiar with the concept of Multispectral Multibeam Echosounder</i> 7. <i>Students are able to explain about tides and their effects on hydrographic surveys.</i> 8. <i>Students know about Underwater Acoustic Positioning and its applications</i> 																																																																																										
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="694 1594 1284 1982"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>		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								✓		CLO.5						✓				CLO.6							✓	✓		CLO.7						✓				CLO.8								✓	
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Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i>	-											
Pokok Bahasan <i>Content</i>	<ol style="list-style-type: none"> 1. Teori dan konsep dalam survei hidrografi 2. Aplikasi survei hidrografi dalam berbagai bidang dan keperluan 3. Aspek teknis instrumen akustik bawah air 4. Ship's motion dan Transducer Mounting 5. Konsep propagasi gelombang suara di kolom air 6. Faktor-faktor yang mempengaruhi propagasi gelombang suara saat akuisisi 7. Perhitungan kecepatan gelombang suara di kolom air 8. Konsep dan aplikasi Multispektral Multibeam Echosounder 9. Pasang surut dan perannya terhadap survei hidrografi 10. Cara kerja dan aplikasi Underwater Acoustic Positioning <ol style="list-style-type: none"> 1. <i>Theories and concepts in hydrographic surveying</i> 2. <i>Application of hydrographic surveys in various fields and purposes</i> 3. <i>Technical aspects of underwater acoustic instruments</i> 4. <i>Ship's motion and Transducer Mounting</i> 5. <i>Concept of sound wave propagation in the water column</i> 6. <i>Factors affecting the propagation of sound waves during acquisition</i> 7. <i>Calculation of the speed of sound waves in the water column</i> 8. <i>Multispectral Multibeam Echosounder concept and application</i> 9. <i>Tides and their role in hydrographic surveys</i> 10. <i>How Underwater Acoustic Positioning works and application</i> 											
Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 75%; text-align: center;">Rencana Evaluasi</th> <th style="width: 25%; text-align: center;">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1 <i>Assignment 1</i></td> <td style="text-align: center;">25%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td style="text-align: center;">25%</td> </tr> <tr> <td>Tugas 2 <i>Assignment 2</i></td> <td style="text-align: center;">25%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td style="text-align: center;">25%</td> </tr> </tbody> </table>		Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assignment 1</i>	25%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	25%	Tugas 2 <i>Assignment 2</i>	25%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	25%
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Evaluasi Akhir Semester <i>Final Semester Exam</i>	25%											

Media yang digunakan <i>Media employed</i>	Classical teaching tools with white board and power point presentation
Daftar Pustaka <i>Reading list</i>	<ol style="list-style-type: none"> 1. IHO., 2020. IHO Standards for Hydrographic Survey. 6th Edition. Special Publication 44. Monaco 2. Poerbandono., Djunarsjah, E. 2005. Survei Hidrografi. Bandung: Refika Aditama 3. IHO., 2005. Manual On hydrography. Monaco. International Hydrographic Beareau 4. Lurton, Xavier. 2010. An Introduction to Underwater Acoustic: Principles and Applications: Second Edition. Perancis. Praxis Publ.

25. Analisis Data Hidro-Oseanografi / *Hydro-Oceanography Data Analysis*

Nama modul <i>Module name</i>	Analisis Data Hidro-Oseanografi <i>Hydro-Oceanography Data Analysis</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235801
Mata kuliah <i>Course</i>	Analisis Data Hidro-Oseanografi <i>Hydro-Oceanography Data Analysis</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Danar Guruh Pratomo, S.T., M.T., Ph.D.
Dosen <i>Lecturer</i>	Danar Guruh Pratomo, S.T., M.T., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 2.5 jam x 16 minggu per semester Lecture, 2.5 hours x 16 weeks per semester
Beban belajar <i>Workload</i>	<p>Kuliah: 2.5 jam x 14 minggu = 35 jam Penugasan terstruktur: 2.5 jam x 14 minggu= 35 jam Kegiatan mandiri: 2.5 jam x 14 minggu= 35 jam Ujian: 2.5 jam x 2 kali = 5 jam Paper review: 3 jam x 14 = 42 jam Studi Case-based: 3 jam x 14 = 42 jam Total = 194 jam</p> <p><i>Lecture: 2.5 hours x 14 weeks = 35 hours</i> <i>Structured exercises and assignments: 2.5 x 14 weeks = 35 hours</i> <i>Independent activities: 2.5 x 14 weeks = 35 hours Exam: 2.5 hours x 2 time = 5 hours</i> <i>Paper review: 3 jam x 14 = 42 hours</i> <i>Case-based study: 3 jam x 14 = 42 hours</i> Total = 194 hours</p>
Kredit <i>Credits</i>	3 SKS 3 credits
Persyaratan sesuai dengan peraturan ujian	Minimum 80% kehadiran untuk mengikuti ujian tertulis

<p>Requirements according to the examination regulations</p>	<p>Minimum 80% attendance in this course in order to take the exams</p>
<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mata kuliah Analisis Data Hidrografi merupakan mata kuliah pilihan bidang Hidrografi dan Kelautan yang bertujuan untuk memberikan penjelasan mengenai proses manajemen dan analisis data hidrografi sehingga akan menjadi informasi yang dapat bermanfaat. Pada mata kuliah ini, mahasiswa akan diajarkan mengenai data-data yang dibutuhkan dan dihasilkan dalam survei hidrografi beserta sistem pada data hidrografi tersebut. Diharapkan melalui kuliah ini mahasiswa mengetahui standart yang digunakan dalam pelaksanaan survei hidrografi dan pengolahan data hasil survei hidrografi. Teknik-tehnik akuisisi data baik secara vertikal maupun horizontal juga akan dijelaskan dalam mata kuliah ini. Selain itu, juga akan diberikan gambaran mengenai pelaksanaan survei menggunakan instrument akustik dan non-akustik. Tahap perencanaan desain survei hingga pengolahan dan analisis data hasil survei hidrografi dengan berbagai macam metode yang digunakan juga diajarkan pada mata kuliah ini.</p> <p><i>Hydrographic Data Analysis Course is an elective course in the field of hydrography and marine that aims to provide an explanation about the process of management and analysis of hydrophobic data so that it will be useful information. In this course, students will be taught about the data required and produced in hydrographic surveys along with the system on such hydrografic data. It is hoped that through this lecture the students will learn the standards used in the implementation of hydrographic surveys and the processing of the data of the Hydrographical Survey results. The techniques of data acquisition both vertically and horizontally will also be described in this course. In addition, an overview of the conduct of surveys using acoustic and non-acoustic instruments will be provided. The planning stages of survey design to the processing and analysis of hydrographic survey data with a variety of methods used are also taught in this course.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mampu menjelaskan data yang dibutuhkan dalam survei hidrografi 2. Mampu menjelaskan mengenai marine spatial data infrastructure: pengertian, parameter, kerangka dan pengaplikasiannya 3. Mampu memahami metadata dalam survei hidrografi

<p><i>Module objectives/ course learning outcomes</i></p>	<ol style="list-style-type: none"> 4. Memiliki pengetahuan tentang standar survei hidrografi di Indonesia dan internasional 5. Mampu menjelaskan teknik yang digunakan dalam akuisisi data hidrografi baik penentuan secara vertikal maupun horizontal 6. Mampu memahami pelaksanaan survei menggunakan instrumen akustik dan non-akustik beserta perencanaan desain survei 7. Mampu melakukan pengolahan data hidrografi dan membangun basis data hidrografi 8. Mampu menganalisis data hidrografi hasil pengolahan <ol style="list-style-type: none"> 1. <i>Able to explain the data required in hydrographic surveys</i> 2. <i>Able to explain about marine spatial data infrastructure: definition, parameters, frameworks and applications</i> 3. <i>Able to understand metadata in hydrographic surveys</i> 4. <i>Has knowledge of hydrographic survey standards in Indonesia and internationally</i> 5. <i>Able to explain the techniques used in hydrographic data acquisition both vertically and horizontally</i> 6. <i>Able to understand the execution of surveys using acoustic and non-acoustic instruments along with survey design planning</i> 7. <i>Able to perform hydrographic data processing and build hydrographic database</i> 8. <i>Able to analyze hydrographic data from processing</i> 																																																																																										
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 1402 1283 1787"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>CLO.8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>		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					✓		✓			CLO.5							✓			CLO.6								✓		CLO.7							✓	✓		CLO.8								✓	
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<p>Mata kuliah wajib prasyarat <i>Mandatory prerequisites</i></p>	<p>-</p>																																																																																										
<p>Pokok Bahasan</p>	<ol style="list-style-type: none"> 1. Penjelasan Akuisisi Data Hidrografi berbagai Metode 2. Komponen metadata hasil survei hidrografi 																																																																																										

<p><i>Content</i></p>	<ol style="list-style-type: none"> 3. Pengambilan dan pengolahan data hidrografi menggunakan instrumen Singlebeam Echosounder (SBES) 4. Penggunaan berbagai metode pada visualisasi data hidrografi 5. Aspek penyimpanan data dan pembangunan basis data hidrografi 6. Distribusi data hidrografi <ol style="list-style-type: none"> 1. <i>Description of Hydrographic Data Acquisition in Different Methods</i> 2. Hydrographic survey metadata component 3. Data acquisition and processing of hydrographic data using Singlebeam Echosounder instrument (SBES) 4. Application of various methods to hydrographic data visualization 5. Aspects of data storage and hydrographic database development 6. Hydrographic data distribution 										
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" data-bbox="711 1010 1430 1408"> <thead> <tr> <th data-bbox="711 1010 1257 1088">Rencana Evaluasi</th> <th data-bbox="1257 1010 1430 1088">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 1088 1257 1167">Tugas 1 <i>Assignment 1</i></td> <td data-bbox="1257 1088 1430 1167">25%</td> </tr> <tr> <td data-bbox="711 1167 1257 1245">Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td data-bbox="1257 1167 1430 1245">25%</td> </tr> <tr> <td data-bbox="711 1245 1257 1323">Tugas 2 <i>Assignment 2</i></td> <td data-bbox="1257 1245 1430 1323">25%</td> </tr> <tr> <td data-bbox="711 1323 1257 1408">Evaluasi Akhir Semester <i>Final Semester Exam</i></td> <td data-bbox="1257 1323 1430 1408">25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1 <i>Assignment 1</i>	25%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	25%	Tugas 2 <i>Assignment 2</i>	25%	Evaluasi Akhir Semester <i>Final Semester Exam</i>	25%
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Tugas 2 <i>Assignment 2</i>	25%										
Evaluasi Akhir Semester <i>Final Semester Exam</i>	25%										
<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with white board and power point presentation</p>										
<p>Daftar Pustaka <i>Reading list</i></p>											

26. Oseanografi Fisik Lanjut / *Advanced Physical Oceanography*

Nama modul <i>Module name</i>	Oseanografi Fisik Lanjut <i>Advanced Physical Oceanography</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235803
Mata kuliah <i>Course</i>	Oseanografi Fisik Lanjut <i>Advanced Physical Oceanography</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Danar Guruh Pratomo, S.T., M.T., Ph.D.
Dosen <i>Lecturer</i>	Danar Guruh Pratomo, S.T., M.T., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i></p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian	Minimum 80% kehadiran untuk mengikuti ujian tertulis

<p><i>Requirements according to the examination regulations</i></p>	<p><i>Minimum 80% attendance in this course in order to take the exams</i></p>
<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mata kuliah ini berfokus pada pengenalan dan pemahaman mengenai proses fisik lautan dan keterkaitannya terhadap survei pemetaan di laut. Secara umum, pendekatan fenomena yang terjadi di area pesisir seperti proses pantai maupun estuari dan fluktuasi muka air laut juga disampaikan dalam mata kuliah ini. Selain itu, dipaparkan pula berbagai instrumen untuk mengobservasi fenomena tersebut. Mata kuliah ini ditujukan kepada mahasiswa magister yang akan melakukan penelitian mengenai geomatika kelautan. Program pada mata kuliah ini baik berupa pemaparan materi, praktikum atau pemodelan, maupun penugasan lainnya akan mampu memberikan kesempatan kepada mahasiswa agar dapat berpikir kritis terhadap fenomena fisik di lautan beserta pengaruhnya terhadap hasil akuisisi data kedalaman menggunakan instrumen akuistik untuk pemetaan laut.</p> <p><i>This course focuses on the introduction and understanding of the physical processes of the ocean and their relationship to mapping surveys at sea. In general, approaches to phenomena that occur in coastal areas such as coastal processes and estuaries and sea level fluctuations are also presented in this course. In addition, various instruments to observe this phenomenon are presented. This course is intended for master students who will conduct research on marine geomatics. Programs in this course in the form of material presentations, practicum or modeling, as well as other assignments will be able to provide opportunities for students to think critically about physical phenomena in the ocean and their effects on the results of depth data acquisition using acoustic instruments for ocean mapping.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mahasiswa mampu memahami konsep dan teori dari proses fisik di lautan atau oseanografi fisik 2. Mahasiswa mampu menjelaskan keterkaitan antara laut dan atmosfer 3. Mahasiswa mengetahui proses dan parameter distribusi panas di lautan (ocean heat budget) 4. Mahasiswa memahami berbagai parameter fisik lautan yang berhubungan dengan propagasi gelombang suara di kolom air

<p><i>Module objectives / course learning outcomes</i></p>	<ol style="list-style-type: none"> 5. Mahasiswa mampu menjelaskan konsep pengaruh parameter fisik lautan terhadap cepat rambat gelombang suara 6. Mahasiswa mampu mengetahui tentang dinamika air laut 7. Mahasiswa mengetahui proses terbentuknya pantai beserta geomorfologi pesisir 8. Mahasiswa mengetahui instrumen yang digunakan dalam observasi fenomena fisik di lautan <ol style="list-style-type: none"> 1. <i>Students are able to understand the concepts and theories of physical processes in the ocean or physical oceanography</i> 2. <i>Students are able to explain the relationship between the ocean and the atmosphere</i> 3. <i>Students know the process and parameters of heat distribution in the ocean (ocean heat budget)</i> 4. <i>Students understand the various physical parameters of the oceans related to the propagation of sound waves in the water column</i> 5. <i>Students are able to explain the concept of the influence of ocean physical parameters on the speed of sound waves</i> 6. <i>Students are able to know about the dynamics of seawater</i> 7. <i>Students know the process of the formation of the coast along with coastal geomorphology</i> 8. 9. <i>tudents know the instruments used in observing physical phenomena in the ocean</i> 																																																																																										
<p>CPMK dan hubungan dengan CPL Prodi <i>Learning outcomes and their corresponding to PLOs</i></p>	<table border="1" data-bbox="695 1402 1283 1787"> <thead> <tr> <th></th> <th>PLO.1</th> <th>PLO.2</th> <th>PLO.3</th> <th>PLO.4</th> <th>PLO.5</th> <th>PLO.6</th> <th>PLO.7</th> <th>PLO.8</th> <th>PLO.9</th> </tr> </thead> <tbody> <tr> <td>CLO.1</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.2</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.4</td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.6</td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLO.7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>CLO.8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table>		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				✓						CLO.5							✓			CLO.6					✓					CLO.7						✓	✓			CLO.8								✓	
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<p>Pokok Bahasan</p>	<ol style="list-style-type: none"> 1. Pengantar oceanografi dan oseanografi fisika 2. Pengaruh atmosfer terhadap lautan 																																																																																										

<p><i>Content</i></p>	<ol style="list-style-type: none"> 3. <i>Ocean heat budget</i> 4. <i>Temperatur, salinitas, densitas</i> 5. <i>Harmonic sound speed</i> 6. <i>Dinamika air laut: current, ocean wave, tides</i> 7. <i>Proses pantai: coastal process dan pasang surut</i> 8. <i>Estuari</i> 9. <i>Instrumen observasi parameter oseanografi</i> 10. <i>Shelf processes-stratification</i> 11. <i>R.O.F.I's</i> <ol style="list-style-type: none"> 1. <i>Introduction to oceanography and physical oceanography</i> 2. <i>The influence of the atmosphere on the ocean</i> 3. <i>Ocean heat budget</i> 4. <i>Temperature, salinity, density</i> 5. <i>Harmonic sound speed</i> 6. <i>Ocean dynamics: current, ocean wave, tides</i> 7. <i>Coastal processes: coastal process and tides</i> 8. <i>Estuary</i> 9. <i>Instruments for observing oceanographic parameters</i> 10. <i>Shelf processes-stratification</i> 11. <i>R.O.F.I's</i> 																
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Rencana Evaluasi</th> <th style="text-align: center;">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td>Tugas 1. Interaksi Lautan dan Atmosfer Task 1. Ocean - Atmosphere Interaction</td> <td style="text-align: center;">5%</td> </tr> <tr> <td>Tugas 2. Kondisi Fisik Laut Task 2. Physical Setting of the Ocean</td> <td style="text-align: center;">5%</td> </tr> <tr> <td>Kuis 1. Dinamika Air Laut Quiz 1. Ocean Dynamics</td> <td style="text-align: center;">5%</td> </tr> <tr> <td>Evaluasi Tengah Semester <i>Mid Semester Exam</i></td> <td style="text-align: center;">25%</td> </tr> <tr> <td>Tugas 3. Proses Pantai dan Instrumennya Task 3. Coastal Process and Instruments</td> <td style="text-align: center;">15%</td> </tr> <tr> <td>Kuis 2. ROFi Quiz 2. ROFi</td> <td style="text-align: center;">15%</td> </tr> <tr> <td>Evaluasi Akhir Semester <i>Final Exam</i></td> <td style="text-align: center;">30%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	Tugas 1. Interaksi Lautan dan Atmosfer Task 1. Ocean - Atmosphere Interaction	5%	Tugas 2. Kondisi Fisik Laut Task 2. Physical Setting of the Ocean	5%	Kuis 1. Dinamika Air Laut Quiz 1. Ocean Dynamics	5%	Evaluasi Tengah Semester <i>Mid Semester Exam</i>	25%	Tugas 3. Proses Pantai dan Instrumennya Task 3. Coastal Process and Instruments	15%	Kuis 2. ROFi Quiz 2. ROFi	15%	Evaluasi Akhir Semester <i>Final Exam</i>	30%
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<p>Media yang digunakan <i>Media employed</i></p>	<p>Classical teaching tools with white board and power point presentation</p>																
<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Stewart, R.H., 2000. Introduction to Physical Oceanography. Department of Oceanography 2. Sahala Hutabarat dan Stewart M. Evans. 2008. Pengantar Oseanografi. UI Press 																

	<ol style="list-style-type: none">3. David Tolmazin. 1985. Elements of Dynamic Oceanography. Springer, Dordrecht4. John H. Simpson dan Jonathan Sharples. 2012. Introduction to the Physical and Biological Oceanography of Shelf Seas. Cambridge University Press5. Matthias Tomczak. 2000. Introduction to Physical Oceanography6. Matthias Tomczak. 2000. Shelf and Coastal Oceanography.
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27. Aspek Geodetik dalam Hukum Laut / *Geodetic Aspects of the Law of the Sea*

Nama modul <i>Module name</i>	Aspek Geodetik dalam Hukum Laut <i>Geodetic Aspects of Law of the Sea</i>
Tingkatan <i>Module level</i>	Pasca Sarjana (S2) <i>Master Degree</i>
Kode <i>Code</i>	CM235804
Mata kuliah <i>Course</i>	Aspek Geodetik dalam Hukum Laut <i>Geodetic Aspects of Law of the Sea</i>
Semester <i>Semester</i>	III (tiga) atau IV (empat) <i>III (three) or IV (four)</i>
Penanggung jawab mata kuliah <i>Person responsible for the module</i>	Danar Guruh Pratomo, S.T., M.T., Ph.D.
Dosen <i>Lecturer</i>	Danar Guruh Pratomo, S.T., M.T., Ph.D.
Bahasa <i>Language</i>	Bahasa Indonesia dan Bahasa Inggris <i>Indonesian and English</i>
Relasi pada kurikulum <i>Relation to curriculum</i>	Mata kuliah pilihan untuk Program Master Teknik Geomatika <i>Elective Courses for Master of Geomatics Engineering</i>
Tipe pertemuan, jam tatap muka <i>Type of teaching, contact hours</i>	Kuliah, 1.67 jam x 16 minggu per semester <i>Lecture, 1.67 hours x 16 weeks per semester</i>
Beban belajar <i>Workload</i>	<p>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</p> <p><i>Lecture: 1.67 hours x 14 weeks = 23.38 hours</i> <i>Structured exercises and assignments: 2 hours x 14 weeks = 28 hours</i> <i>Independent activities: 2 hours x 14 weeks = 28 hours</i> <i>Exam: 1.67 hours x 2 time = 3.34 hours</i> <i>Paper review: 2.83 jam x 14 = 39.62</i> <i>Case-based study: 2.83 jam x 14 = 39.62</i> <i>Total = 161.96 hours</i></p>
Kredit <i>Credits</i>	2 SKS + 2 SKS tambahan beban <i>2 credits + 2 credits additional activities</i>
Persyaratan sesuai dengan peraturan ujian	Minimum 80% kehadiran untuk mengikuti ujian tertulis

<p><i>Requirements according to the examination regulations</i></p>	<p><i>Minimum 80% attendance in this course in order to take the exams</i></p>
<p>Deskripsi Mata Kuliah</p> <p><i>Description of Course</i></p>	<p>Mata kuliah ini menjelaskan mengenai keterkaitan antara kondisi fisik laut dari sisi geodesi terhadap hukum laut. Mahasiswa akan mendapatkan berbagai materi dari aspek teknis dan legal mengenai hukum laut tersebut. Materi-materi tersebut disampaikan pada teacher-based, student-based, dan project-based selama masa pembelajaran. Secara garis besar materi yang akan dipelajari antara lain: hukum laut internasional, kondisi fisik perairan Indonesia, Geodetic Aspects of the Law of the Sea (GALOS), dan datum yang digunakan serta luaran berupa peta laut.</p> <p><i>This course explains the relationship between the physical condition of the sea from the geodetic point of view and the law of the sea. Students will get various materials from the technical and legal aspects of the law of the sea. These materials are delivered to teacher-based, student-based, and project-based during the learning period. Broadly speaking, the materials to be studied include: international law of the sea, the physical condition of Indonesian waters, Geodetic Aspects of the Law of the Sea (GALOS), and the datum used and the output in the form of a marine map.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p> <p><i>Module objectives/ Course learning outcomes</i></p>	<ol style="list-style-type: none"> 1. Mampu memahami aspek geodesi: model bumi, datum horisontal, datum vertikal, dan parameter transformasi 2. Mampu memahami proyeksi peta: jarak geodesi dan loxodrome 3. Mampu menyebutkan dan menjelaskan jenis peta laut: conventional charts dan electronic nautical chart 4. Mampu menjelaskan sources and reliability: S100, S57, S53 IHO 5. Mampu menentukan baselines laut 6. Mampu menentukan maritime zones 7. Mampu merencanakan zonasi wilayah pesisir dan pulau-pulau kecil melalui RZWP3K 8. Mampu memanfaatkan marine cadastre dalam penentuan hukum laut berdasarkan aspek geodetik <p><i>1. Able to understand aspects of geodesy: earth model, horizontal datum, vertical datum, and datum transformation parameters</i></p> <p><i>2. Able to understand map projections: geodetic and loxodrome distances</i></p>

	<p>4. <i>Types of nautical charts: conventional charts and electronic nautical charts</i></p> <p>5. <i>Sources and reliability of geodetic aspects in maritime law are based on: S100, S57, S53 IHO</i></p> <p>6. <i>Marine baselines are based on the geodetic aspect of maritime law</i></p> <p>7. <i>Marine baselines are based on the geodetic aspect of maritime law</i></p> <p>8. <i>Data and information on zoning planning for coastal areas and small islands through RZWP3K</i></p> <p>9. <i>Marine cadastre in determining maritime law based on geodetic aspects</i></p>														
<p>Pembelajaran dan Persyaratan Ujian <i>Study and examination requirements and forms of examination</i></p>	<table border="1" data-bbox="711 701 1428 1261"> <thead> <tr> <th data-bbox="711 701 1275 779">Rencana Evaluasi</th> <th data-bbox="1275 701 1428 779">Bobot Weight</th> </tr> </thead> <tbody> <tr> <td data-bbox="711 779 1275 857"><i>Tugas 1 Assignment 1</i></td> <td data-bbox="1275 779 1428 857">10%</td> </tr> <tr> <td data-bbox="711 857 1275 936"><i>Kuis 1 Quiz 1</i></td> <td data-bbox="1275 857 1428 936">10%</td> </tr> <tr> <td data-bbox="711 936 1275 1014"><i>Evaluasi Tengah Semester Mid Exam</i></td> <td data-bbox="1275 936 1428 1014">25%</td> </tr> <tr> <td data-bbox="711 1014 1275 1093"><i>Tugas 2 Assignment 2</i></td> <td data-bbox="1275 1014 1428 1093">15%</td> </tr> <tr> <td data-bbox="711 1093 1275 1171"><i>Tugas 3 Assignment 3</i></td> <td data-bbox="1275 1093 1428 1171">15%</td> </tr> <tr> <td data-bbox="711 1171 1275 1261"><i>Evaluasi Akhir Semester Final Exam</i></td> <td data-bbox="1275 1171 1428 1261">25%</td> </tr> </tbody> </table>	Rencana Evaluasi	Bobot Weight	<i>Tugas 1 Assignment 1</i>	10%	<i>Kuis 1 Quiz 1</i>	10%	<i>Evaluasi Tengah Semester Mid Exam</i>	25%	<i>Tugas 2 Assignment 2</i>	15%	<i>Tugas 3 Assignment 3</i>	15%	<i>Evaluasi Akhir Semester Final Exam</i>	25%
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<p>Daftar Pustaka <i>Reading list</i></p>	<p>1) Alexander 1993, International Maritime Boundaries, National Legislative Series, Netherlands</p> <p>2) Beazley 1987, Maritime Limits and Baseline, The Hydrographic Society, UK</p> <p>3) Sjamsir Mira 1993 dan 1997, GALOS Proceedings I dan II, Penerbit ITB</p>														

	<p><i>management of marine areas</i></p> <p>5. <i>Able to provide solutions to marine cadastre problems through a case study using both spatial and non-spatial data</i></p>																																																												
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<p>Pokok Bahasan</p> <p><i>Content</i></p>	<ol style="list-style-type: none"> Definisi kadaster laut Metode deliniasi batas laut Pengembangan metode pemetaan kadaster laut. Pasang surut air laut Jenis data dalam kadaster laut. Peraturan perundang-undangan kelautan Kompilasi Database Kadaster Laut <ol style="list-style-type: none"> <i>Definition of maritime cadastre</i> <i>Maritime boundary delineation method</i> <i>Development of marine cadastral mapping methods</i> <i>Sea tides</i> <i>Types of data used in marine cadastre</i> <i>Maritime legislation</i> <i>Compilation of Marine Cadastral Database</i> 																																																												
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<p>Daftar Pustaka <i>Reading list</i></p>	<ol style="list-style-type: none"> 1. Barry M and Fourie C 2002 Evaluating Cadastral Systems in Uncertain Situations: A Conceptual Framework based on Soft Systems Theory. <i>International Journal of Geographical Information Science</i> 16(1) 23-40 2. Collier P A, Leahy F J and Williamson, I P 2001. Defining a Marine Cadastre for Australia. <i>Proceedings of the 42nd Australian Surveyors Congress, Brisbane.</i> 3. Fowler C and Treml E 2001. Building a Marine Cadastral Information System for the United States – a case study. <i>Computers, Environment and Urban Systems</i>, 25, 493-507 4. Grant D and Williamson I 1999. Report of the Workshop on Land Tenure and Cadastral Infrastructures for Sustainable Development – Bathurst 18-22 October 1999, <i>International Conference on Land Tenure and Cadastral Infrastructures for Sustainable Development, Melbourne.</i> 9. IHO 2014, TALOS, Edisi ke-5, Monaco

<p>Persyaratan sesuai dengan peraturan ujian <i>Requirements according to the examination regulations</i></p>	<p>Minimum 80% kehadiran untuk mengikuti ujian tertulis <i>Minimum 80% attendance in this course in order to take the exams</i></p>
<p>Deskripsi Mata Kuliah <i>Description of Course</i></p>	<p>Mata kuliah ini memberikan serta membahas proses, metode (membangun & mengimplementasikan) perencanaan dan pengelolaan kegiatan di wilayah pantai. Konsep kunci & teknik perencanaan serta pengelolaan pesisir akan dipelajari di mata kuliah ini. Contoh pengelolaan wilayah peisir juga disajikan dalam mata kuliah ini dengan memperkenalkan serta mempelajari pengalaman dari Indonesia, negara-negara Asia Tenggara, dan negara-negara lain terutama dalam hal pengelolaan pesisir berkelanjutan.</p> <p><i>This course provides and discusses processes, methods (building & implementing) planning and managing activities in coastal areas. Key concepts & techniques for coastal planning and management will be studied in this course. Examples of coastal area management are also presented in this course by introducing and studying experiences from Indonesia, Southeast Asian countries and other countries, especially in terms of sustainable coastal management.</i></p>
<p>Capaian Pembelajaran / Course Learning Outcomes</p>	<ol style="list-style-type: none"> 1. Mampu menjelaskan wilayah pesisir, definisi, sifat area pesisir, dan sejarah singkat pengelolaan pesisir. 2. Mampu menjelaskan dan menunjukkan contoh Isu Pengelolaan Pesisir: pertumbuhan penduduk; pemanfaat pesisir; dampak pemanfaatan pesisir oleh masyarakat; isu administratif di wilayah pesisir; serta con-toh permasalahan wilayah pesisir di Indonesia maupun negara lain. 3. Mampu menjelaskan peran pemerintah nasional, provinsi, atau daerah dalam pengelolaan aktivitas di pesisir Indonesia. 4. Mampu menjelaskan langkah utama dan langkah penting dalam proses perencanaan pengelolaan wilayah pesisir. 5. Mampu memberikan contoh strategi manajemen aktivitas di pesisir di negara Indonesia dan negara asing. 6. Mampu menerapkan konsep proses perencanaan & pengelolaan pesisir dalam program peren-canaan & pengelolaan pesisir nasional/provinsi serta aspek legal yang menyertainya. 7. Mampu menjelaskan pengetahuan tentang

<p><i>Module objectives/ Course learning outcomes</i></p>	<p>perkembangan saat ini dalam praktek perencanaan & pengelolaan pesisir yang berkelanjutan terutama dalam fokus sosio-ekonomi.</p> <p>8. Mampu menjelaskan & melakukan riset penting saat ini dalam bidang perencanaan & pengelolaan pesisir.</p> <ol style="list-style-type: none"> 1. <i>Able to explain coastal areas, definitions, characteristics of coastal areas, and a brief history of coastal management.</i> 2. <i>Able to explain and show examples of Coastal Management Issues: population growth; coastal users; impact of coastal use by the community; administrative issues in coastal areas; as well as examples of coastal area problems in Indonesia and other countries.</i> 3. <i>Able to explain the role of national, provincial or regional governments in managing activities on Indonesian coasts.</i> 4. <i>Able to explain the main steps and important steps in the coastal area management planning process.</i> 5. <i>Able to provide examples of coastal activity management strategies in Indonesia and foreign countries.</i> 6. <i>Able to apply the concept of coastal planning & management processes in national/provincial coastal planning & management programs as well as the legal aspects that accompany them.</i> 7. <i>Able to explain knowledge about current developments in sustainable coastal planning & management practices, especially in a socio-economic focus.</i> 8. <i>Able to explain and carry out important current research in the field of coastal planning & management.</i> 																																																																																										
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