PROGRAM STUDI MAGISTER TEKNIK GEOMATIKA
MASTER OF GEOMATICS ENGINEERING

BUKU PEDOMAN MATA KULIAH

COURSES MODULE HANDBOOK

APLIKASI GEODESI SATELIT

APPLIED SATELLITE GEODESY

DEPARTEMEN TEKNIK GEOMATIKA

Fakultas Teknik Sipil, Perencanaan, dan Kebumian

DEPARTMENT OF GEOMATICS ENGINEERING

Faculty of Civil Engineering, Planning, and Geo Engineering

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

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

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

Deskripsi Mata Kuliah *Description of Course*	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. *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.*
Capaian Pembelajaran / *Course Learning Outcomes* *Module objectives / Course learning outcomes*	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 mempu menjelaskan konsep sistem waktu. 4. Mahasiswa mampu menjelaskan konsep sinyal dan metode propagasi sinyal. 5. Mahasiswa mampu menjelaskan mengenai lapisan atmosfer dan perananya dalam geodesi satelit. 6. Mahasiswa mampu menjelaskan mengenai sistem orbit. 7. Mahasiswa mampu menjelaskan mengenai berbagai aplikasi geodesi satelit. *1. Students are able to explain 2D and 3D coordinate systems.* *2. Students are able to explain about reference frames both space fix reference frames and earth-fix reference frames.* *3. Students are able to explain the concept of time system.* 4. *Students are able to explain the concept of signal and signal propagation method.* 5. *Students are able to explain the layers of the atmosphere and their role in satellite geodesy.* *6. Students are able to explain the orbit system.* *7. Students are able to explain about various applications of satellite geodesy.*

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<tr><td>CPMK dan hubungan dengan CPL Prodi
Learning outcomes and their corresponding to PLOs</td><td>
<table>
<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>
<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>
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<tr><td>Mata kuliah wajib prasyarat
Mandatory prerequisites</td><td>-</td></tr>
<tr><td>Pokok Bahasan

Content</td><td>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 (Geodetic Satellite Missions: Observing the Earth from Space)
4. Dasar-dasar mekanika langit (body problem), 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

1. The purpose and development of geodesy satellites
2. The basic concept of a satellite system: coordinate system, time system, orbit system and signal propagation.
3. Geodetic satellite systems for geodetic science (Geodetic Satellite Missions: Observing the Earth from Space)
4. The basics of celestial mechanics (body problem), satellite movement disturbances, orbit determination, satellite orbit constellation
5. GNSS Satellite System: concepts and applications
6. VLBI, SLR, LLR Satellite System: concepts and applications
7. Active and passive remote sensing Satellite Systems
8. Altimetry Satellite System: concepts and applications
9. Gravity Satellite System: concepts and applications</td></tr>
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<tr><td>Pembelajaran dan Persyaratan Ujian
Study and examination requirements and forms of examination</td><td>
<table>
<tr><th>Rencana Evaluasi</th><th>Bobot
Weight</th></tr>
<tr><td>Presentasi
Presentation</td><td>30%</td></tr>
<tr><td>Evaluasi Tengah Semester
Mid Term Exam</td><td>20%</td></tr>
<tr><td>Tugas
Assignment</td><td>25%</td></tr>
<tr><td>Evaluasi Akhir Semester
Final Exam</td><td>25%</td></tr>
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<tr><td>Media yang digunakan
Media employed</td><td>Classical teaching tools with white board and power point presentation</td></tr>
<tr><td>Daftar Pustaka
Reading list</td><td>1. Seeber, G. (1993). Satellite Geodesy, Foundations, Methods and Applications. Berlin. New York: Walter de Gruyter.
2. Kaula, W.M. (2000). Theory of Satellite Geodesy. New York: Dover Publications, Inc.
3. Abidin, H.Z. (2001). Geodesi Satelit. P.T. Pradnya Paramita, Jakarta. ISBN 979-408-462-X.219 pp.
4. Torge, W. 2001. Geodesy. 3rd ed. Berlin: Walter de Gruyter.</td></tr>
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