PROGRAM STUDI MAGISTER TEKNIK GEOMATIKA
MASTER OF GEOMATICS ENGINEERING

BUKU PEDOMAN MATA KULIAH

COURSES MODULE HANDBOOK

PEMODELAN GAYABERAT BUMI

EARTH'S GRAVITY MODELLING

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

3. Pemodelan Gayaberat Bumi / *Earth Gravity Modelling*

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

<table>
<tr><td>Deskripsi Mata Kuliah

Description of Course</td><td>Matakuliah ini mempelajari pemodelan bentuk dan ukuran Bumi (Geoid) menggunakan data gayaberat dengan berbagai metode.

This course studies the modeling of the shape and size of the Earth (Geoid) using gravity data with various methods.</td></tr>
<tr><td>Capaian Pembelajaran / Course Learning Outcomes

Module objectives/ Course learning outcomes</td><td>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.

1. Able to explain the basic concepts of various geoid modeling methods.
2. Able to create gravimetric geoid models using various methods from gravity data obtained from measurements.
3. Able to perform analysis and validation of the resulting geoid model.</td></tr>
<tr><td>CPL Prodi yang dibebankan
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>
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<tr><td>Mata kuliah wajib prasyarat
Mandatory prerequisites</td><td>-</td></tr>
<tr><td>Pokok Bahasan

Content</td><td>1. Teori dasar gayaberat Bumi
2. Pengukuran dan reduksi anomali gayaberat Bumi
3. Model Gayaberat Bumi Global
4. Solusi Integral Stokes
a. Direct Numerical Integration
b. FFT
c. LSC
5. Pemodelan Geoid Gravimetrik
6. Pemodelan Geoid menggunakan Gravsoft

1. The basic theory of Earth's gravity
2. Measurement and reduction of the Earth's gravity anomaly
3. Global Earth Gravity Model</td></tr>
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<tr><td></td><td>4. Stokes Integral Solution
a. Direct Numerical Intregation
b. FFT
c. LSC
5. Gravimetric Geoid Modelling
6. Geoid Modeling using Gravsoft</td></tr>
<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>Tugas 1: Data gayaberat
Assign 1: Gravity Data</td><td>10%</td></tr>
<tr><td>Tugas 2: Studi Literatur (Geoid Model)
Assign 2: Literature study (Geoid Model)</td><td>10%</td></tr>
<tr><td>Presentasi Hasil Case Study
Case Study Presentation</td><td>10%</td></tr>
<tr><td>Tugas 3: Geoid Gravimetrik sederhana
Assign 3: Simple Gravimetric Geoid</td><td>20%</td></tr>
<tr><td>Tugas 4: Pemodelan Geoid
Assign 4: Geoid Modelling</td><td>35%</td></tr>
<tr><td>Presentasi hasil team-based project
Team-based project presentation</td><td>15%</td></tr>
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<tr><td>Media yang digunakan
Media employed</td><td>Classical teaching tools with whiteboard and powerpoint presentation</td></tr>
<tr><td>Daftar Pustaka
Reading list</td><td>

Hofmann-Wellenhof, B. and H. Moritz. 2005. Physical Geodesy. Vienna: Springer.
Bomford, G. 1980. Geodesy, Oxford University Press, Oxford
Torge, W. 2001. Geodesy. de Gruyter, Berlin.
Vaníček, P. and E.J. Krakiwsky.1986. Geodesy: the Concepts. 2nd ed. Amsterdam: Elsevier
Torge, W. 1989. Gravimetry. de Gruyter, Berlin.
Blakely, R.J. 1994. Potential Theory in Gravity and Magnetic Applications, Cambridge University Press, Cambridge.
Chuji Tsuboi. 1979. Gravity, Allen & Unwin, London.

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