UNIVERSITAS GADJAH MADA

Module Handbook

Bachelor in Cartography and Remote Sensing
Geographic Information Science Department
Faculty of Geography
Universitas Gadjah Mada

www.kpj.geo.ugm.ac.id

www.geo.ugm.ac.id

General Information and Notes to the Reader

BCRS curriculum is designed to be taken for 8 semesters (4 years), with maximum allowable study period is 7 years; according to Ministry of Research, Technology and Higher Education Regulation No. 44 of 2015 about National Standards of Higher Education, article 16. The hierarchy of BCRS curriculum is structured based on the course codes, which is a representation of the year of courses offered, main field of the course, and courses sequence. The first digit of the course code represents the year of the course offered; the second represents the main field of the courses; and the third and fourth digits represent the sequence of the courses within its corresponding main field.

Course Code: GKP		
	Remarks	**Code**
First Digit: Year of subject	First Year (semester 1 & 2)	1
	Second Year (semester 3 & 4)	2
	Third Year (semester 5 & 6)	3
	Fourth year (semester 7 & 8)	4
Second Digit: The main field of Department	Cartography	1
	Remote Sensing	2
	Geographic Information System	3
Third and Fourth Digit: The sequence of courses listed	**Cartography**	Cartography (01), Map Projection (02), Land Surveying (03), Topographic Mapping and Toponymic Survey (04), Thematic Cartography (05), Digital Cartography (06), Management of Surveying and Mapping (07), Analytical Cartography (08), Visualization of Geospatial Information (09)
	Remote Sensing	Physics of Waves and Optics (01), Remote Sensing (02), Photogrammetry (03), Photographic Remote Sensing System (04), Passive Non-Photographic Remote Sensing System (05), Digital Image Processing (06), Active Remote Sensing System (07), Remote Sensing of Landscape Ecology (08), Remote Sensing of Lithosphere (09), Remote Sensing for Hydrology and Watershed Management (10), Remote Sensing for Urban Studies (11), Image-Based Terrain Analysis and Evaluation (12), Coastal and Ocean Remote Sensing (13), Remote Sensing of Atmosphere and Climate Change (14), Geoinformation of Health (15), Remote Sensing and GIS for Regional Development (16)

	Geographic Information System	Geographic Information System (01), Spatial Database and Data Infrastructure (02), Algorithm and Programming (03), Spatial Analysis and Modelling (04), Spatial Programming (05), Spatial Data Mining (06), Geospatial Information Technology (07)

Notes to the reader:

Non-binding Information:

Module descriptions are intended to enhance transparency and aid student orientation regarding course offerings. They are not legally binding. Actual modifications to the described contents may occur in practice.

Elective Modules:

Please be aware that the module handbook may not include all compulsory and elective modules offered within the study program. The module handbook exclusively includes courses administered by the study program.

Abbreviations for prerequisite courses:

S: currently taking the course

A: has taken the course

P: has passed the course

Bachelor in Cartography and Remote Sensing Courses

No.	Code	Course	Status*	Credits
1st Semester				
1	GKP 1001	Geographic Information Science Profession and Industry	C	1
2	GKP 1101	Cartography	C	2
3	GKP 0101	Cartography (practicum)	C	1
4	GEO 2002	Civic Education	C	2
5	GEO 1003	Introduction to Geography	C	2
6	GKP 1201	Physics of Waves and Optics	C	2
7	GEO 1005	Pancasila Education	C	2
8	GEL 1101	Geology	C	2
9	GEL 1301	Human Geography	C	3
10	GEO 1010	Biogeography	C	2
11	GEL 1201	Meteorology and Climatology	C	2
2nd Semester				
12	GKP 1202	Remote Sensing	C	2
13	GKP 0202	Remote Sensing (practicum)	C	1
14	GEL 1102	Geomorphology	C	2
15	GEL 0102	Geomorphology (practicum)	C	1
16	GPW 1103	Regional Science	C	2
17	GEO 1007	Mathematics	C	2
18	GEO 1008	Statistics	C	2
19	GEL 1202	Hydrology	C	2
20	GEO 1003	Field Work 1: Introduction to Landscape	C	2
21	GKP 1102	Map Projection	E	2
22	GKP 0102	Map Projection (practicum)	E	1
23	GEL 1401	Ecology and Environmental Science	E	2
24	GEL 2108	Oceanography	E	2
3rd Semester				
25	GKP 2103	Land Surveying	C	2
26	GKP 0103	Land Surveying (practicum)	C	1
27	GKP 2203	Photogrammetry	C	2
28	GKP 0203	Photogrammetry (practicum)	C	1
29	GKP 2204	Photographic Remote Sensing System	C	2
30	GKP 0204	Photographic Remote Sensing System (practicum)	C	1
31	GKP 2301	Geographic Information System	C	2
32	GKP 0301	Geographic Information System (practicum)	C	1
33	GEO 2001	Religion Study	C	2
34	GEL 2104	Soil Science	C	2
35	GEL 0104	Soil Science (practicum)	C	1

36	GPW 2101	Regional Geography of Indonesia	C	2
37	GPW 0101	Regional Geography of Indonesia (practicum)	C	1
38	GKP 2104	Topographic Mapping and Toponimic Survey	E	2
39	GKP 0104	Topographic Mapping and Toponimic Survey (practicum)	E	1
40	GPW 1201	Spatial Theories	E	2
4th Semester				
41	GKP 2001	Fieldwork 2: Geospatial Data Acquisition for Building Regional Database	C	3
42	GKP 2105	Thematic Cartographic	C	3
43	GKP 0105	Thematic Cartographic (practicum)	C	1
44	GKP 2205	Passive Non-Photographic Remote Sensing System	C	2
45	GKP 0205	Passive Non-Photographic Remote Sensing System (practicum)	C	1
46	GKP 2206	Remote Sensing Digital Image Processing	C	2
47	GKP 0206	Remote Sensing Digital Image Processing (practicum)	C	1
48	GKP 2302	Spatial Database and Data Infrastructure	C	2
49	GKP 0302	Spatial Database and Data Infrastructure (practicum)	C	1
50	GKP 2303	Algorithm and Programming	C	2
51	GKP 0303	Algorithm and Programming (practicum)	C	1
52	GKP 2207	Active Remote Sensing System	E	2
53	GKP 0207	Active Remote Sensing System (practicum)	E	1
54	GEL 2208	Tropical Climate	E	2
55	GEL 2106	Geomorphological Survey and Mapping	E	2
56	GEL 0106	Geomorphological Survey and Mapping (practicum)	E	1
5th Semester				
57	GKP 3001	Applied Statistics for Geospatial Data	C	2
58	GKP 0001	Applied Statistics for Geospatial Data (practicum)	C	1
59	GEO 3002	Indonesian Language	C	2
60	GKP 3106	Digital Cartography	E	2
61	GKP 0106	Digital Cartography (practicum)	E	1
62	GKP 3208	Remote Sensing of Landscape Ecology	E	2
63	GKP 0208	Remote Sensing of Landscape Ecology (practicum)	E	1
64	GKP 3209	Remote Sensing of Lithosphere	E	2
65	GKP 0209	Remote Sensing of Lithosphere (practicum)	E	1
66	GKP 3304	Spatial Analysis and Modelling	E	2
67	GKP 0304	Spatial Analysis and Modelling (practicum)	E	1
68	GKP 3305	Spatial Programming	E	2
69	GKP 0305	Spatial Programming (practicum)	E	1
70	GPW 4201	Spatial and Regional Planning	E	2
71	GPW 0201	Spatial and Regional Planning (practicum)	E	1
72	GEL 3109	Disaster Management	E	2
73	GEL 0109	Disaster Management (practicum)	E	1
6th Semester				

74	GKP 3002	Research Methods in Geographic Information Science	C	2
75	GKP 3107	Management of Surveying and Mapping	C	2
76	GKP 0107	Management of Surveying and Mapping (practicum)	C	1
77	GKP 3003	Fieldwork 3: Geospatial Analysis and Modelling	C	3
78	GEO 4001	Community Service	C	3
79	GKP 3108	Analytical Cartography	E	2
80	GKP 0108	Analytical Cartography (practicum)	E	1
81	GKP 3210	Remote Sensing of Hydrology and Watershed Management	E	2
82	GKP 0210	Remote Sensing of Hydrology and Watershed Management (practicum)	E	1
83	GKP 3211	Remote Sensing for Urban Survey	E	2
84	GKP 0211	Remote Sensing for Urban Survey (practicum)	E	1
85	GKP 3306	Spatial Data Mining	E	2
86	GKP 0306	Spatial Data Mining (practicum)	E	1
87	GEL 2107	Soil, Erosion Survey, and Conservation Planning	E	2
88	GEL 0107	Soil, Erosion Survey, and Conservation Planning (practicum)	E	1
7th Semester				
89	GKP 4001	Research Proposal	C	2
90	GKP 4002	Research Proposal Seminar	C	1
91	GKP 4110	Visualization of Geospatial Information	E	3
92	GKP 0110	Visualization of Geospatial Information (practicum)	E	1
93	GKP 4212	Image-Based Terrain Analysis and Evaluation	E	2
94	GKP 0212	Image-Based Terrain Analysis and Evaluation (practicum)	E	1
95	GKP 4213	Coastal and Ocean Remote Sensing	E	2
96	GKP 0213	Coastal and Ocean Remote Sensing (practicum)	E	1
97	GKP 4214	Remote Sensing of Atmosphere and Climate Change	E	2
98	GKP 4215	Geoinformation of Health	E	2
99	GKP 4216	Remote Sensing and GIS for Regional Development	E	2
100	GKP 4307	Geospatial Information Technology	E	2
101	GKP 0307	Geospatial Information Technology (practicum)	E	1
102	GEO 3001	Entrepreneurship	E	2
103	GEO 4003	Contextual Religion Study	E	2
8th Semester				
104	GKP 4004	Undergraduate Thesis	C	6
105	GKP 4003	Internship	E	3

***Status**:
C: Compulsory course
E: Elective course

Geographic Information Science Profession and Industry

<table>
<tr><td colspan="3">Module designation
GKP 1001</td><td>Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor degree</td><td>Semester
1st</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Drs. Projo Danoedoro, M.Sc., Ph.D.</td><td colspan="2">Lecturer
Drs. Projo Danoedoro, M.Sc., Ph.D.
Dr. Taufik Hery Purwanto, M.Si.
Dr. Bowo Susilo, S.Si., M.T.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term tests: 45%
Final Examination: 45%</td><td colspan="2">Workload Total: 42 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 14 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 14 hrs
● Literature study: 14 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
Knowledge: To learn the prospect and development of profession and industry related to Geographic Information Science field</td></tr>
<tr><td colspan="4">Content:
Profession certification, type of jobs in geospatial industry</td></tr>
<tr><td colspan="4">Teaching and learning methods:
Lectures, blended learning, group discussion</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend lectures for at least 70% (seventy percent) of the total number of meetings held by lecturers and get a minimum grade of C</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Jensen, J.R., 2014, Remote Sensing Of The Environment: An Earth Resource Perspective, Pearson Prentice Hall, New York.
Kementerian Ketenagakerjaan, 2017, Keputusan Menteri Ketenagakerjaan No 95 tahun 2017 tentang Penetapan Standar Kompetensi Kerja Nasional Indonesia Kategori Aktivitas Profesional, Ilmiah dan Teknis Golongan Pokok Aktivitas Arsitektur dan Keinsinyuran; Analisis dan Uji Teknis Bidang Informasi Geospasial
Lillesand, T. M., Kiefer, R. W., Chipman, J. W., 2004, Remote Sensing and Image Interpretation, John Willey & Sons, New York.
Longley P.A., Goodchild M.F., et al., 2005, Geographic Information System and Science, 2nd Edition, John Wiley & Sons, Ltd., England
Robinson et al., 1995, Elements of Cartography, 6th Edition, New York: John Wiley & Sons</td></tr>
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Cartography

<table>
<tr><td colspan="3">Module designation
GKP 1101</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor degree</td><td>Semester
1st</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Noorhadi Rahardjo, M.Si. P.M.</td><td colspan="3">Lecturer
Dr. Noorhadi Rahardjo, M.Si. P.M.
Dr. Sudaryatno, M.Si.
Dr. Bowo Susilo, S.Si., M.T.
Totok Wahyu Wibowo, S.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term tests: 45%
Final Examination: 45%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to understand the concept of cartography to support the spatial approach in geography.
● Able to explain the map making process in regard to cartographic rules and in accordance with technological developments.
● Able to understand how to use maps, including map reading and map analysis based on map elements.</td></tr>
<tr><td colspan="5">Content:
Definitions of cartography and maps, map scale, map projection, map symbol, map generalization, geographic names, toponym, map composition/layout, relief representation, and map reading.</td></tr>
<tr><td colspan="5">Teaching and learning methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="3">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend lectures for at least 70% (seventy percent) of the total number of meetings held by lecturers and get a minimum grade of C</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Harvey, F., 2008, A Primer GIS: Fundamenal Geographic and Cartographic Concepts, New York: The Guilford Press.
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J., 2012, Map Use: Reading Analysis Interpretation (7th Ed), California: ESRI Press.
Kraak, M. and Ormeling, F., 2010. Cartography: Visualization of Geospatial Data (3rd Ed), Harlow: Pearson Education Limited.
Krygier, J., and Wood, D., 2011, Making Maps: A Visual Guide to Map Design for GIS, New York: The Guilford Press.
Robinson, A., Morrison, J., Muehrcke, P., Kimerling, A., and Guptill, S., 1995, Elements of Cartography (6th Ed), Toronto: John Wiley & Sons.
Tyner, J., 2010, Principles of Map Design, New York: The Guilford Press.
Vozenilek, V., 2014, Chapter 4 Map Design, In: F. Ormeling & B. Rystedt, eds. The World of Maps, International Cartographic Association (ICA)</td></tr>
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Cartography (Practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0101</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor degree</td><td>Semester
1st</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Candra Sari Djati K., S.Si., M.Sc.</td><td colspan="2">Lecturer
Candra Sari Djati K., S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain, select and make the map elements in the process of map making in accordance with cartographic rules and in accordance with technological developments
● Able to apply how to use the map which includes reading and analyzing the map
● Able to communicate the exercise results both written and verbally</td></tr>
<tr><td colspan="4">Content:
Map sketching/drawing, scale conversion, map projection, map symbol, map generalization, lettering, map analysis, relief representation, map making.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (A/S)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Harvey, F., 2008, A Primer GIS: Fundamenal Geographic and Cartographic Concepts, New York: The Guilford Press.
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J., 2012, Map Use: Reading Analysis Interpretation (7th Ed), California: ESRI Press.
Kraak, M. and Ormeling, F., 2010. Cartography: Visualization of Geospatial Data (3rd Ed), Harlow: Pearson Education Limited.
Krygier, J., and Wood, D., 2011, Making Maps: A Visual Guide to Map Design for GIS, New York: The Guilford Press.
Longley, P., Goodchild, M., Maguire, D., and Rhind, D., 2011, Geographic Information Systems & Science (3rd Ed), New Jersey: John Wiley & Sons.
Robinson, A., Morrison, J., Muehrcke, P., Kimerling, A., and Guptill, S., 1995, Elements of Cartography (6th Ed), Toronto: John Wiley & Sons.
Tyner, J., 2010, Principles of Map Design, New York: The Guilford Press.</td></tr>
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Physics of Waves and Optics

<table>
<tr><td colspan="2">Module designation
GKP 1201</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor degree</td><td>Semester
1st</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module</td><td colspan="2">Lecturer</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Mid-term tests: 50%
Final Examination: 50%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to understand the concept of electromagnetic waves and light.
● Able to explain the relationship between optical physics and these waves as a basis for understanding the use of electromagnetic waves and light in remote sensing.</td></tr>
<tr><td colspan="4">Content:
This course studies the concept of electromagnetic waves, the properties of electromagnetic waves, light, properties of light, color, reflection and refraction, light emission and light quanta, optical geometry, and optical instruments. Furthermore, the application of optical and wave physics to remote sensing technology is also studied.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td>Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend lectures for at least 70% (seventy percent) of the total number of meetings held by lecturers and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:</td></tr>
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Remote Sensing

<table>
<tr><td colspan="2">Module designation
GKP 1202</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor degree</td><td>Semester
2nd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Prima Widayani, S. Si., M. Si.</td><td colspan="2">Lecturer
Drs. Projo Danoedoro, M.Sc., Ph.D.
Dr. Sigit Heru Murti Budi Santosa, S. Si., M. Si.
Dr. Prima Widayani, S. Si., M. Si.
Dr. Iswari Nur Hidayati, S. Si., M. Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term tests: 45%
Final Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to understand the position of remote sensing in geographical studies
● Able to understand the principles of remote sensing and its fundamentals of physics
● Able to explain remote sensing image characteristics and its interpretations
● Able to describe the application of remote sensing in geographical studies</td></tr>
<tr><td colspan="4">Content:
Introduction to remote sensing (i. e. sensors, resolutions), remote sensing data acquisition and image interpretation, land cover characteristics and classification, multispectral imagery classification, remote sensing sampling and accuracy assessment</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend lectures for at least 70% (seventy percent) of the total number of meetings held by lecturers and get a minimum grade of C</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Campbell, J.B. & Wynne, R. H. 2001. Introduction to Remote Sensing, 5th Edt. New York: The Guildford Press.
Lillesand, T. M. & Kiefer, R. W. 1990. Penginderaan Jauh dan Interpretasi Citra (Dialih-bahasakan oleh Prof. Dr. Sutanto). Yogyakarta: Gadjah Mada University Press
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.</td></tr>
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Remote Sensing (Practicum)

<table>
<tr><td colspan="3">Module designation
GKP0202</td><td>Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor degree</td><td>Semester
2nd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Prima Widayani, S.Si., M.Si.</td><td colspan="2">Lecturer
Dr. Prima Widayani, S.Si., M.Si.
Dr. Iswari Nur Hidayati, S.Si., M.Si.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total:</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to understand the acquisition of remote sensing image data, distinguish the types of remote sensing data and their characteristics
● Able to identify objects from remote sensing data by utilizing elements of interpretation
● Able to interpret aerial photographs stereoscopically and interpret multispectral satellite imagery of land use and land cover
● Able to take samples in the field for accuracy and reinterpretation tests</td></tr>
<tr><td colspan="4">Content:
Interpretation elements, image type recognition, interpretation key, interpretation of land use and land cover, visual interpretation, stereoscopic interpretation, and map accuracy assessment</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (P/A)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Campbell, J.B. & Wynne, R. H. 2001. Introduction to Remote Sensing, 5th Edt. New York: The Guildford Press.
Lillesand, T. M. & Kiefer, R. W. 1990. Penginderaan Jauh dan Interpretasi Citra (Dialih-bahasakan oleh Prof. Dr. Sutanto). Yogyakarta: Gadjah Mada University Press
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.
Sutanto. 2013. Metode Penelitian Penginderaan Jauh. Yogyakarta: Gadjah Mada University Press.</td></tr>
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Map Projection

<table>
<tr><td colspan="2">Module designation
GKP 1102</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
2nd</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Nurul Khakim, M. Si.</td><td colspan="2">Lecturer
Dr. Nurul Khakim, M. Si.
Dr. Bowo Susilo, S. Si., M. T.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term tests: 45%
Final Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● To have an understanding to the concepts of earth’s models (i.e spheroid, geoid, and ellipsoid),
● To have an understanding of map projection systematics, in order to transform a three dimensional object into two dimensional surface (map).
● To have skills in constructing three primary projection types along with it’s calculations
● To have capability of calculating the distortion caused by map projection
● To have capability of selecting the best map projection in particular area</td></tr>
<tr><td colspan="4">Content:
Advanced introduction to map projections, earth’s geometric properties, map projection’s systematic, map projection types and constructions, map projection transformation</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Bugayevskiy, L.M., and John P. Zinder. 1995. Map Projection : A Reference Manual. Taylor & Francis Ltd. London
Dana, H.Peter. 2007. Map Projection. http://www.colorado.edu/geography/
Grafarend, E. W., & Krumm, F. W. (2006). Map Projections: Cartographic Information Systems. Stuttgart: Springer.
Robinson,A, et al. 1995. Elements of Carthography. Mc. Grow Hill, New York USA
Symons & Oxtoby . 1977 : Map Projection : for Post-Graduate Student. ITC. The Netherland
Wongsotjitro, Sutomo, 1982 : Ilmu Proyeksi Peta. Penerbit Yayasan Kanisius. Bandung</td></tr>
</table>

Map Projection (Practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0102</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
2nd</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Ari Cahyono, S.Si., M.Sc.</td><td colspan="2">Lecturer
Ari Cahyono, S.Si., M.Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain concepts in map projection which includes datum, shape of the earth, coordinate system, map distortion, and projection system transformation
● Able to identify projection system information on conventional maps and digital maps, able to define projection systems, able to identify-analyse-visualize map projection distortions that occur and can determine the use of certain projection systems in accordance with the purpose of mapping and the aspect of the projection that will be maintained
● Able to work independently or in groups in carrying out cartographic work, especially in the field of map projections
● Able to present cartographic work, especially related to map projections in a written or oral scientific report</td></tr>
<tr><td colspan="4">Content:
Map projection concept, coordinate system concept, map distortion analysis, map projection type, and identify the shape of the earth and datum</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (A),
GKP 1102 (A/S)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Kennedy, M. & Kopp, S. 2001. Understanding Map Projections. USA: Esri Press.
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J., 2012, Map Use: Reading Analysis Interpretation (7th Ed), California: ESRI Press.
Robinson, A., Morrison, J., Muehrcke, P., Kimerling, A., and Guptill, S., 1995, Elements of Cartography (6th Ed), Toronto: John Wiley & Sons.</td></tr>
</table>

Land Surveying

<table>
<tr><td colspan="2">Module designation
GKP 2103</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sudaryatno, M.Si.</td><td colspan="2">Lecturer
Dr. Sudaryatno, M.Si.
Dr. Nurul Khakhim, M.Si.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 15%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the concept of measurement on the surface of the earth as a curved field to support various applications in the field of geography.
● Able to define measurement methods, both terrestrial and extra-terrestrial, to acquire geospatial data and present it on the map.
● Able to plan and carry out field work using land surveying methods.</td></tr>
<tr><td colspan="4">Content:
The principle of land surveying, basic of measurements, chain surveying, traversing, levelling, error in observation, electronic distance measurement, tacheometry, and GNSS.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Chandra, A.M., 2005, Surveying: Problem Solving with Theory and Objective Type Questions, New Delhi, New Age International Publishers.
Ghilani, C.D., and Wolf, P.R., 2012, Elementary Surveying: An Introduction to Geomatics (13th edition), New Jersey, Prentice Hall.
Suyono, S., 1992, Pengukuran Topografi dan Teknik Pemetaan, Jakarta, PT. Pradnya Paramita.
Wongsotjitro, S., 1991. Ilmu Ukur Tanah, Yogyakarta, Penerbit Kanisus.</td></tr>
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Land Surveying (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0103</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Ari Cahyono, S.Si., M.Sc.</td><td colspan="2">Lecturer
Ari Cahyono, S.Si., M.Sc.
Candra Sari Djati Kartika, S. Si., M. Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Master the use of measurement instruments for land surveying
● Able to master different aspect of surveying (i. e. angles, elevation, or distance) using various tools and different methods
● Able to conduct terrestrial surveys in accordance to mapping objectives
● Able to cooperate in teams in carrying out field measurements and data proccessing</td></tr>
<tr><td colspan="4">Content:
introduction of surveying tools, distance measurements, angle measurements, chain surveying, traversing, differential levelling, Geodetic GPS and GNSS, trigonometical levelling, contour map making through a direct survey</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (P),
GKP 2103 (A/S)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td>Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Chandra, A.M., 2005, Surveying: Problem Solving with Theory and Objective Type Questions, New Delhi, New Age International Publishers.
Estopinal, Stephen V., 2009, A Guide to Understanding Land Surveys (3rd Edition), New Jersey: John Wiley and Sons.
Ghilani, C., and Wolf, P., 2012, Elementary Surveying: An Introduction to Geomatics (13th Edition), New Jersey: Pearson Education.
Longley, P., Goodchild, M., Maguire, D., and Rhind, D., 2005, Geographical Information System and Science (2nd Edition), Chichester: John Wiley and Sons.
Wongsotjitro, S., 1991. Ilmu Ukur Tanah, Yogyakarta, Penerbit Kanisus.</td></tr>
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Photogrammetry

<table>
<tr><td colspan="2">Module designation
GKP 2203</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Taufik Hery Purwanto, S. Si., M. Sc.</td><td colspan="2">Lecturer
Barandi Sapta Widartono, S. Si., M. Si., M. Sc.
Dr. Taufik Hery Purwanto, S. Si., M. Si.
Dr. Iswari Nur Hidayati, S. Si., M. Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 15%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
• Able to explain the principles of photogrammetry and its methods of acquisitions
• Able to understand the procedures, instruments, and properties of aerial photographs
• Able to understand the physical properties of aerial photographs acquisitions</td></tr>
<tr><td colspan="4">Content:
Introduction to photogrammetry, basics of airborne remote sensing and image acquisitions, photogrammetric procedures and instruments, properties of aerial photographs</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Lillesand, T. M. & Kiefer, R. W. 1990. Penginderaan Jauh dan Interpretasi Citra (Dialih-bahasakan oleh Prof. Dr. Sutanto). Yogyakarta: Gadjah Mada University Press
Marzolff, I., Aber, J. S., and Ries, J. (2010). Small-Format Aerial Photography: Principles, Techniques and Geoscience Applications. Amsterdam: Elsevier.
Paine, D. P., & Kiser, J. D. (2012). Aerial Photography and Image Interpretation (3rd Edition). Hoboken, NJ: John Wiley & Sons.
Wolf, P. R., Dewitt, B. A., & Wilkinson, B. E. (2014). Elements of Photogrammetry: Applications in GIS (4th Edition). New York, NY: McGraw-Hill Education.</td></tr>
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Photogrammetry (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0203</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Iswari Nur Hidayati, S. Si., M. Sc.</td><td colspan="2">Lecturer
Dr. Iswari Nur Hidayati, S. Si., M. Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to identify the properties of aerial photographs
● Able to calculate the physical properties and metrical information of aerial photograph
● Able to process digital aerial photographs, including orthorectification and DEM generation</td></tr>
<tr><td colspan="4">Content:
Introduction to photogrammetry, basics of airborne remote sensing and image acquisitions, properties of aerial photographs, analytical photogrammetry, digital photogrammetry product processing</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2203 (A/S),
GKP 1202 (A)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Egels, Y., & Kasser, M. (2002). Digital Photogrammetry. London: Taylor and Francis
Lillesand, T. M. & Kiefer, R. W. 1990. Penginderaan Jauh dan Interpretasi Citra (Dialih-bahasakan oleh Prof. Dr. Sutanto). Yogyakarta: Gadjah Mada University Press
Marzolff, I., Aber, J. S., and Ries, J. (2010). Small-Format Aerial Photography: Principles, Techniques and Geoscience Applications. Amsterdam: Elsevier.
Paine, D. P., & Kiser, J. D. (2012). Aerial Photography and Image Interpretation (3rd Edition). Hoboken, NJ: John Wiley & Sons.
Wolf, P. R., Dewitt, B. A., & Wilkinson, B. E. (2014). Elements of Photogrammetry: Applications in GIS (4th Edition). New York, NY: McGraw-Hill Education.</td></tr>
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Photographic Remote Sensing System

<table>
<tr><td colspan="2">Module designation
GKP 2204</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Barandi Sapta Widartono, S. Si., M. Si., M. Sc.</td><td colspan="2">Lecturer
Barandi Sapta Widartono, S. Si., M. Si., M. Sc.
Dr. Iswari Nur Hidayati, S. Si., M. Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
• Able to understand the principles and history of aerial photography
• Able to explain the physical properties of photographic systems and its complementary elements
• Able to explain the applications of aerial photography in geographical studies
• Able to understand the regulations behind aerial photography operations</td></tr>
<tr><td colspan="4">Content:
Principles and history of aerial photography, basics of photographic systems, physical properties of photographic systems and its complementary elements, applications of aerial photography, regulations regarding to aerial photography</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Lillesand, T. M. & Kiefer, R. W. 1990. Penginderaan Jauh dan Interpretasi Citra (Dialih-bahasakan oleh Prof. Dr. Sutanto). Yogyakarta: Gadjah Mada University Press
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.
Paine, D. P., & Kiser, J. D. (2012). Aerial Photography and Image Interpretation (3rd Edition). Hoboken, NJ: John Wiley & Sons.</td></tr>
</table>

Photographic Remote Sensing System (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0204</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Iswari Nur Hidayati, S. Si., M. Sc.</td><td colspan="3">Lecturer
Dr. Iswari Nur Hidayati, S. Si., M. Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 25%
Self-report: 30%
Assignments: 10%
Examination: 25%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to demonstrate the principles of light with online simulations
● Able to apply the principles of photographic systems in aerial photography
● Able to create a flight plan for aerial photograph acquisitions
● Able to interpret the aerial photograph results</td></tr>
<tr><td colspan="5">Content:
Physical principles of light, principles of photographic systems, aerial photography flight planning, aerial photography image interpretation</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 0204 (A/S),
GKP 1202 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal, internet simulators, and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Lillesand, T. M. & Kiefer, R. W. 1990. Penginderaan Jauh dan Interpretasi Citra (Dialih-bahasakan oleh Prof. Dr. Sutanto). Yogyakarta: Gadjah Mada University Press
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.
Paine, D. P., & Kiser, J. D. (2012). Aerial Photography and Image Interpretation (3rd Edition). Hoboken, NJ: John Wiley & Sons.</td></tr>
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Geographic Information System

<table>
<tr><td colspan="2">Module designation
GKP 2301</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. R. Suharyadi, M. Sc.</td><td colspan="2">Lecturer
Dr. R. Suharyadi, M. Sc.
Dr. Taufik Hery Purwanto, S. Si., M. Si.
Raden Ibnu Rosyadi, S. Si., M. Cs.
Dr. Nur Mohammad Farda, S. Si., M. Cs.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
• Able to understand the fundamentals of Geographic Information System
• Able to explain the applications of spatial data
• Able to understand the components of Geographic Information System
• Able to understand the process and quality of a spatial data</td></tr>
<tr><td colspan="4">Content:
Fundamentals of Geographic Information System, spatial information system and database applications, digital Geographic Information System and its components, Geographic Information System database management, spatial data quality assessment, spatial data processing and manipulation</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Aronoff, D. (1989). Geographic Information Systems: A Management Perspective. Ottawa: WDL Publication.
Antenucci, J. C. (1991). Geographic Information Systems: A Guide to The Technology. New York: Van Nostrand Reinhold.
Berhardsen, T. (1992). Geographic Information System. Norway: VIAK IT.
Longley, P., & Clarke, G. (1995). GIS for Business and Service Planning. Cambridge: Geoinformation.</td></tr>
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Geographic Information System (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0301</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sandy Budi Wibowo, S. P., M. Sc.</td><td colspan="2">Lecturer
Dr. Sandy Budi Wibowo, S. P., M. Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to understand the concepts of spatial thinking
● Able to demonstrate GIS data construction and manipulation
● Able to work with spatial data topology and updating
● Able to demonstrate spatial data geoprocessing</td></tr>
<tr><td colspan="4">Content:
Fundamentals of spatial thinking, map making in GIS, GIS data construction and manipulation, spatial data topology, spatial data updating, spatial geoprocessing</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2301 (A/S)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Aronoff, D. (1989). Geographic Information Systems: A Management Perspective. Ottawa: WDL Publication.
Antenucci, J. C. (1991). Geographic Information Systems: A Guide to The Technology. New York: Van Nostrand Reinhold.
Berhardsen, T. (1992). Geographic Information System. Norway: VIAK IT.
Longley, P., & Clarke, G. (1995). GIS for Business and Service Planning. Cambridge: Geoinformation.</td></tr>
</table>

Topographic Mapping and Toponymic Survey

<table>
<tr><td colspan="2">Module designation
GKP 2104</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Nurul Khakhim, M.Si</td><td colspan="2">Lecturer
Dr. Nurul Khakhim, M.Si.
Dr. Sudaryatno, M.Si.
Ari Cahyono, S. Si, M. Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz & Assignments: 20%
Mid-term: 40%
Final Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● To understand map reading and analysis on the topographic map
● To be able to update the topographic map based on field survey and/or other methods
● To apply geographic naming standard in a topographic map
● To be able to conduct toponymic survey</td></tr>
<tr><td colspan="4">Content:
Introduction of topographic map, topographic map properties, standards of topographic maps, geographical names, geographic naming standard, field survey.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, and quiz/written assignments.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Campbell, J 1998, Map Use and Analysis 3rd eds., McGraw-Hill, New York.
Kerfoot, H 2003, 'Office Processing of Geographical Names', dalam Ormeling, F., Stabe, K. H., and Sievers, J. (eds), Training Course on Toponymy, Verlag des Bundesamtes für Kartographie and Geodäsie, Frankfurt am Main.
Muehrcke, PC 1980, Map Use; reading, analysis, and interpretation, JP Publications, Madison, WI.
Ormeling, F 2005, Introduction to Toponymy Course, slide dipresentasikan pada The International Training Course on Toponymy, 11 – 13 September, 2005, Kota Batu, Malang.
Rais, J 2005, Standardization of Geographical Names in Indonesia, slide dipresentasikan pada The International Training Course on Toponymy, 11 – 13 September, 2005, Kota Batu, Malang.
Robinson, AH, Morrison, JL, Muehrcke, PC, Kimerling, AJ & Guptill, SC 1995, Elements of Cartography 6th eds., John Wiley & Sons, Inc., New York.
Sinaga, M 1998, Pemetaan Topografi (topographic mapping), Program Pascasarjana UGM, Yogyakarta.
Tichelaar, J 2003, 'Toponymy and Language', dalam Ormeling, F., Stabe, K. H., and Sievers, J. (eds), Training Course on Toponymy, Verlag des Bundesamtes für Kartographie and Geodäsie, Frankfurt am Main</td></tr>
</table>

Topographic Mapping and Toponymic Survey (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0104</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
3rd</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Ari Cahyono, S.Si., M.Sc</td><td colspan="3">Lecturer
Ari Cahyono, S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● To be able to compare topographic maps in various country in the world
● To be able to analyze the appropriate geospatial data which is suitable for topographic mapping
● To apply scientific method in constructing topographic map and toponymic database.</td></tr>
<tr><td colspan="5">Content:
Topographic maps, flattening and distortion, updating topographic maps, compiling toponymic data</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2104 (A/S),
GKP 1101 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Campbell, J 1998, Map Use and Analysis 3rd eds., McGraw-Hill, New York.
Kerfoot, H 2003, 'Office Processing of Geographical Names', dalam Ormeling, F., Stabe, K. H., and Sievers, J. (eds), Training Course on Toponymy, Verlag des Bundesamtes für Kartographie and Geodäsie, Frankfurt am Main.
Muehrcke, PC 1980, Map Use; reading, analysis, and interpretation, JP Publications, Madison, WI.
Ormeling, F 2005, Introduction to Toponymy Course, slide dipresentasikan pada The International Training Course on Toponymy, 11 – 13 September, 2005, Kota Batu, Malang.
Prihandito, A 1988, Proyeksi Peta, Kanisius, Yogyakarta.
Rais, J 2005, Standardization of Geographical Names in Indonesia, slide dipresentasikan pada The International Training Course on Toponymy, 11 – 13 September, 2005, Kota Batu, Malang.
Robinson, AH, Morrison, JL, Muehrcke, PC, Kimerling, AJ & Guptill, SC 1995, Elements of Cartography 6th eds., John Wiley & Sons, Inc., New York.
Sinaga, M 1998, Pemetaan Topografi (topographic mapping), Program Pascasarjana UGM, Yogyakarta.
Tichelaar, J 2003, 'Toponymy and Language', dalam Ormeling, F., Stabe, K. H., and Sievers, J. (eds), Training Course on Toponymy, Verlag des Bundesamtes für Kartographie and Geodäsie, Frankfurt am Main.</td></tr>
</table>

Fieldwork 2: Geospatial Data Acquisition for Building Regional Database

<table>
<tr><td colspan="2">Module designation
GKP 2001</td><td colspan="2">Credits
3 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Lecturer team</td><td colspan="2">Lecturer
Dr. Sandy Budi Wibowo, S. P., M. Sc.
Dr. Sc. Sanjiwana Arjasakusuma, S. Si., M. GIS.
Dr. Nur Mohammad Farda, S. Si., M. Cs.
Dr. Taufik Hery Purwanto, S. Si., M. Si.
Dr. R. Suharyadi, M. Sc.
Dr. Nurul Khakim, M. Si.
Barandi Sapta Widartono, S. Si., M. Si., M. Sc.
Ari Cahyono, S. Si., M. Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignments: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 120 hrs</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs
Field observation : 20 hrs</td><td>Student’s self-study time:
● Group discussion : 14 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to identify the area problem in the perspective of geographic information science
● Able to describe and explain various geospatial data that can be involved in solving regional problems
● Able to apply a wide range of geospatial data acquisition methods in the field with various related survey equipment as per scientific research procedures
● Able to work in teams in designing and carrying out geospatial data acquisition activities and the compiled it in a geospatial database and or album map of the region</td></tr>
<tr><td colspan="4">Content:
Basic mapping, mobile GIS, image analysis, topographic mapping, data acquisition using UAV, physical and socio-economic aspect, sampling and accuracy assessment.</td></tr>
<tr><td colspan="4">Teaching methods:
Team lectures, fieldworks</td></tr>
<tr><td>Recommended prerequisites
GEO 1003 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, and written assignments.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, Image Processing Software, GIS Software, PowerPoint Presentations, Projector, and surveying equipment.</td></tr>
<tr><td colspan="4">Reading list:
Campbell, J. B., & Wynne, R. H. (2011). Introduction to Remote Sensing, 5th ed. New York, The Guilford Press.
Congalton, R. G., & Green, K. (2009). Assessing the Accuracy of Remotely Sensed Data, 2nd ed. Florida, CRC Press.
Demers, M. N. (1997). Fundamentals of Geographic Information Systems. New York, John Wiley & Sons.
Jensen, J. R. (2005). Introductory Digital Image Processing : A Remote Sensing Perspective, 3rd ed. New Jersey, Pearson Prentice Hall.
Kraak, M.-J., & Ormeling, F. (2010). Cartography: Visualization of Geospatial Data, 3rd edition. Essex, Pearson</td></tr>
</table>

Education Limited.
Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2008). *Remote Sensing and Image Interpretation, 6th ed*. New Jersey, John Wiley & Sons, Inc.
Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2011). *Geographic Information Sustems & Science, 3rd edition*. New Jersey, US: John Wiley & Sons, Inc.
Maguire, D., & Goodchild, M. F. (1991). *Geographical Information Systems : Principle and applications*. New York : Amerika Serikat: Longman.

Thematic Cartographic

<table>
<tr><td colspan="2">Module designation
GKP2105</td><td colspan="2">Credits
3 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sudaryatno, M.Si.</td><td colspan="2">Lecturer
Dr. Sudaryatno, M.Si.
Dr. Nurul Khakhim, M.Si.
Dr. Noorhadi Rahardjo, M.Si., P.M.
Ari Cahyono, S.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 126 hrs</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs
Mini project: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the concepts and theories in the preparation of thematic maps to present information related to geographical phenomena.
● Able to choose and implement various thematic mapping techniques for dissemination of thematic information with regard to map design.
● Able to develop thematic mapping techniques to solve geographical problems.</td></tr>
<tr><td colspan="4">Content:
Base map, frame map, thematic map (qualitative and quantitative), data sources for mapping, map composition, statistical data for thematic mapping, and non-traditional thematic mapping.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, quiz and written assignments.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Boss, ES, 1973, Carthographic Principles in Thematic Mapping. International Institude for Aerial Survey and Earth Sciences, Enschede, The Netherlands
Boss, ES, 1973, Thematic Carthograpy,. International Institude for Aerial Survey and Earth Sciences, Enschede, The Netherlands.
Ormelling, JR.R.J., 1980, Editing Socio – Economic Maps, ITC - Cartographic Department, Enschede, The Netherland
Tyner, Judith A, 1992. Introduction to Thematic Carthography. Wur.C.Brown, John Campell University of Wisconsin
Kraak M.J. and Ormelling F.J., 1996, Cartography Visualization of Spatial Data , Longman, England
Borden D, Dent, 1999, Carthography Thematic Map Design, Georgia State University, The McGraw Hill Companies, USA</td></tr>
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Thematic Cartographic (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0105</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td colspan="2">Relation to curriculum</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Candra Sari Djati K., S.Si., M.Sc</td><td colspan="3">Lecturer
Candra Sari Djati K., S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● To have capability of constructing frame map based on feature selection and generalization of base map
● To have capability of symbol design specifically to thematic mapping
● To have capability of implementing figure and ground concepts in thematic mapping, especially to display multiple information
● To have capability of constructing dot map, choropleth map, and dasymetric map</td></tr>
<tr><td colspan="5">Content:
Frame map for thematic map, design symbol for thematic map, visual variable implementation, data classification for thematic map, figure and ground concept, choropleth map, dasymetric map, dot map, flow map, and digital thematic mapping.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2105 (A/S),
GKP 1101 (P)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Borden D, Dent, 1999, Carthography Thematic Map Design, Georgia State University, The McGraw Hill Companies, USA
Boss, ES, 1973, Carthographic in Thematic Mapping. Cartographic Department, Enschede, TheNetherland
Judith Tyner, 1992. Introduction to Thematic Carthography. Department of Geographhy California State University, Prentice Hall Englewood Cliffs New Jersey
David J. Cuff and Mark T. Mattdon, 1982, Thematic Maps: Their Design and Production, Methuen. New York and London.</td></tr>
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Passive Non-Photographic Remote Sensing System

<table>
<tr><td colspan="3">Module designation
GKP2205</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sigit Heru Murti Budi Santosa, S.Si., M.Si.</td><td colspan="3">Lecturer
Dr. Sigit Heru Murti Budi Santosa, S.Si., M.Si.
Dr. Pramaditya Wicaksono, S.Si., M.Sc.
Drs. Retnadi Heru Jatmiko, M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 15%
Mid-term: 40%
Examination: 40%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to explain system concepts and applications non-photographic optical remote sensing covers multispectral, hyperspectral, and thermal along with the characteristics of the resulting data.
● Able to explain system concepts and applications Non-photographic optical remote sensing covers multispectral, hyperspectral, and thermal along with the characteristics of the resulting data.</td></tr>
<tr><td colspan="5">Content:
Multispectral and hyper-spectral optical remote sensing systems from low to high resolution, including data acquisition, processing and application in the field of environmental, resource, marine, and disaster. In addition, it also discussed the contribution of image multispectral and hyperspectral remote sensing of information systems/spatial databases.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (A)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Chuvieco, E., & Huete, A. (2009). Fundamentals of Satellite Remote Sensing. Boca Raton: CRC Press
Danoedoro, P. (2012). Penginderaan Jauh Digital. Yogyakarta.
Sabins, F. F. (2007). Remote sensing: principles and applications. Waveland Press.
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.</td></tr>
</table>

Passive Non-Photographic Remote Sensing System (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0205</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sc. Sanjiwana Arjasakusuma, S. Si., M. GIS</td><td colspan="3">Lecturer
Dr. Sc. Sanjiwana Arjasakusuma, S. Si., M. GIS
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to understand the spectral responses of objects and various resolutions in remote sensing system
● Able to process and analyse spectrometer data for remote sensing data
● Able to process hyperspectral remote sensign data
● Able to process remote sensing data, including thermal sensors and radiometric correction</td></tr>
<tr><td colspan="5">Content:
Introduction to spectral responses of objects, resolutions of remote sensing systems (i. e. radiometric, spectral, spatial resolutions), spectrometer data processing and analysis for remote sensing, spectral library building, hyperspectral remote sensing processing and analysis, thermal remote sensing processing, remote sensing image radiometric correction (BRDF)</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2205 (A/S), GKP 1202 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Chuvieco, E., & Huete, A. (2009). Fundamentals of Satellite Remote Sensing. Boca Raton: CRC Press
Danoedoro, P. (2012). Penginderaan Jauh Digital. Yogyakarta.
Sabins, F. F. (2007). Remote sensing: principles and applications. Waveland Press.
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.</td></tr>
</table>

Remote Sensing Digital Image Processing

<table>
<tr><td colspan="3">Module designation
GKP2206</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Muhammad Kamal, M.GIS., Ph.D.</td><td colspan="3">Lecturer
Muhammad Kamal, M.GIS., Ph.D.
Dr. Pramaditya Wicaksono, M.Sc.
Dr.Sc. Sanjiwana Arjasakusuma, M.Sc., M.GIS.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 25%
Assignments: 30%
Mid-term: 15%
Examination: 30%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
• Able to explain the concepts and processes of image storage formats, image sharpening, image correction, image fusion, spectral transformation, and digital image classification.
• Able to integrate digital image processing and geographic information systems.
• Able to test the accuracy of remote sensing digital image processing results</td></tr>
<tr><td colspan="5">Content:
Digital image storage system, format conversion data, basics of image processing and processing techniques. Image processing techniques consist of: preprocessing (radiometric, atmospheric, geometric correction); composite image preparation; image sharpening; image transformation for various purposes of modeling and extraction of biophysical information; classification and presentation of imagery; and integration of extracted images with geographic information systems.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP1202 (P)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Jensen, J. R. (2016). Introductory digital image processing: a remote sensing perspective (No. Ed. 2). Prentice-Hall Inc.
Mather, P. M., & Koch, M. (2011). Computer processing of remotely-sensed images: an introduction. John Wiley & Sons.
Danoedoro, P., 2012. Pengantar Penginderaan Jauh Digital (Yogyakarta. Penerbit Andi. Yogyakarta: Andi.</td></tr>
</table>

Remote Sensing Digital Image Processing (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0206</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Pramaditya Wicaksono, S. Si., M. Sc</td><td colspan="3">Lecturer
Dr. Pramaditya Wicaksono, S. Si., M. Sc
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to perform digital remote sensing image correction, including radiometric and geometric
● Able to perform fusion techniques of remote sensing images
● Able to perform digital image transformation on remote sensing images
● Able to classify remote sensing digital images using pixel-based, object-based, and spectra-based classification techniques
● Able to explain remote sensing digital image processing through writings and orally</td></tr>
<tr><td colspan="5">Content:
Remote sensing radiometric and geometric correction, remote sensing multi-sensor calibration, image topographic correction, remote sensing image fusion, remote sensing image transformation, remote sensing image classification (i. e. pixel-based, object-based, spectral-based)</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (A/S),
GKP 1202 (P)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Jensen, J. R. (2016). Introductory digital image processing: a remote sensing perspective (No. Ed. 2). Prentice-Hall Inc.
Mather, P. M., & Koch, M. (2011). Computer processing of remotely-sensed images: an introduction. John Wiley & Sons.
Danoedoro, P., 2012. Pengantar Penginderaan Jauh Digital (Yogyakarta. Penerbit Andi. Yogyakarta: Andi.</td></tr>
</table>

Spatial Database and Data Infrastructure

<table>
<tr><td colspan="2">Module designation
GKP2302</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. R. Suharyadi, M.Sc.</td><td colspan="2">Lecturer
Dr. R. Suharyadi, M.Sc.
Raden Ibnu Rosyadi, S.Si., M.Cs.
Dr. Taufik Hery Purwanto, S.Si., M.Si.
Barandi Sapta Widartono, S.Si., M.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
• Assignments by lecturer: 28 hrs
• Literature study: 28 hrs
• Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
• Able to know the concept of spatial database and spatial data infrastructure to support the database
• Able to know the types of spatial data and compile them into an integrated database
• Able to know the components of spatial data infrastructure that have a role in designing spatial databases
• Able to apply and implement spatial data infrastructure, including evaluating readiness in the process of designing spatial databases</td></tr>
<tr><td colspan="4">Content:
SDI components, data models, database history, spatial database systems, topological structures, database design and management, entity relationships, and national spatial data infrastructure</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP2301 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. 2015. Principles of Geographic Information Systems. Oxford University Press.
de Smith, M. J., Goodchild, M. F., & Longley, P. A. 2020. Geospatial Analysis: A Comprehensive Guide to Principles, Techniques, and Software Tools. University Press.
Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. 2015. Geographic Information Systems and Science: Fourth Edition. John Wiley & Sons.
O'Sullivan, D., & Unwin, D. 2010. Geographic Information Analysis. John Wiley & Sons.</td></tr>
</table>

Spatial Database and Data Infrastructure (practicum)

<table>
<tr><td colspan="2">Module designation
GKP0302</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sandy Budi Wibowo, S.P., M.Sc.</td><td colspan="2">Lecturer
Dr. Sandy Budi Wibowo, S.P., M.Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to manage, maintain, and update spatial data in the database
● Able to design geography database and apply SDI technology
● Able to apply SQL, geoserver, and analyze geoportal as part of spatial data infrastructure</td></tr>
<tr><td colspan="4">Content:
Database management system, SQL, geographic database design, maintenance and updating of data, SDI technology, geoportal and services, and geoserver</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP2302 (A/S)
GKP2301 (P)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. 2015. Principles of Geographic Information Systems. Oxford University Press.
de Smith, M. J., Goodchild, M. F., & Longley, P. A. 2020. Geospatial Analysis: A Comprehensive Guide to Principles, Techniques, and Software Tools. University Press.
Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. 2015. Geographic Information Systems and Science: Fourth Edition. John Wiley & Sons.
O'Sullivan, D., & Unwin, D. 2010. Geographic Information Analysis. John Wiley & Sons.</td></tr>
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Algorithm and Programming

<table>
<tr><td colspan="3">Module designation
GKP2303</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. R. Suharyadi, M.Sc.</td><td colspan="3">Lecturer
Dr. R. Suharyadi, M.Sc.
Raden Ibnu Rosyadi, S.Si., M.Cs.
Dr. Nur Mohammad Farda, S.Si., M.Cs.
Dr. Sandy Budi Wibowo, S.P., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
• Able to design and apply algorithms in programming languages, and can do system development
• Able to understand the concept of several programming languages
• Able to design simple programming with several different programming languages
• Able to explain code in programming languages and understand running algorithms</td></tr>
<tr><td colspan="5">Content:
Programming language algorithm, algorithm concepts, programming fundamentals (variables, data types, program flow, procedures, and functions), system development approach and life cycle, and systems development approach tools</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to Algorithms (3rd ed.). MIT Press.
Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). Geographic Information Science and Systems (4th ed.). Wiley.
Xiao, N. (2020). GIS Algorithms. CRC Press.</td></tr>
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Algorithm and Programming (practicum)

<table>
<tr><td colspan="3">Module designation
GKP0303</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Raden Ibnu Rosyadi, S.Si., M.Cs.</td><td colspan="3">Lecturer
Raden Ibnu Rosyadi, S.Si., M.Cs.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to understand programming languages in visual basic, HTML, PHP, and Java script
● Able to explain data types, variables, and operators, and understand statements in programming languages
● Able to apply simple algorithms into programming designed on visual basic, web, and Android user interfaces</td></tr>
<tr><td colspan="5">Content:
Visual basic, programming language component (iteration, case, boolean logic, loop, etc.), programming fundamentals (variables, data types, program flow, procedures, and functions), HTML, PHP, Java Script, and android studio</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP2303 (A/S)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to Algorithms (3rd ed.). MIT Press.
Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). Geographic Information Science and Systems (4th ed.). Wiley.
Xiao, N. (2020). GIS Algorithms. CRC Press.</td></tr>
</table>

Active Remote Sensing System

<table>
<tr><td colspan="2">Module designation
GKP 2207</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Muhammad Kamal, S. Si., M. GIS., Ph. D.</td><td colspan="2">Lecturer
Muhammad Kamal, S. Si., M. GIS., Ph. D.
Drs. Retnadi Heru Jatmiko, M. Sc.
Wirastuti Widyatmanti, S. Si., Ph. D.
Dr. Sc. Sanjiwana Arjasakusuma, S. Si., M. GIS.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the principles of active remote sensing systems
● Able to understand the process, data acquisitions, and analysis of active remote sensing data
● Able to comprehend the characteristic of objects in active remote sensing imagery
● Able to understand the applications of active remote sensing systems in geographical studies</td></tr>
<tr><td colspan="4">Content:
Principles of active remote sensing systems (i. e. LiDAR, radar), active remote sensing image acquisitions, active remote sensing data processing and analysis, active remote sensing data interpretation and information extraction, LiDAR and radar applications in geographical studies</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
Rountree, A. K., & Jakowatz Jr., C. V. (2009). Synthetic Aperture Radar Interferometry: Principles and Applications. Artech House.
Zribi, M. (2020). Active Remote Sensing: Physics, Algorithms, and Applications. Elsevier.</td></tr>
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Active Remote Sensing System (practicum)

<table>
<tr><td colspan="2">Module designation
GKP0207</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
4th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr.Sc. Sanjiwana Arjasakusuma, S.Si., M.GIS.</td><td colspan="2">Lecturer
Dr.Sc. Sanjiwana Arjasakusuma, S.Si., M.GIS.
Lab’s Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student’s self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to know the concept of active remote sensing systems and the difference with passive remote sensing systems
● Able to understand the concept of reflection from Lidar in the form of point clouds and process it into DTM and DSM
● Able to understand backscattering on Radar images with various polarizations and process it to obtain information on the earth's surface, such as deformation</td></tr>
<tr><td colspan="4">Content:
Lidar, Radar, Radar image pre-processing, Radar polarization, SAR, interferometry, Lidar point clouds, and DTM and DSM extraction</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 2207 (A/S)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
Rountree, A. K., & Jakowatz Jr., C. V. (2009). Synthetic Aperture Radar Interferometry: Principles and Applications. Artech House.
Zribi, M. (2020). Active Remote Sensing: Physics, Algorithms, and Applications. Elsevier.</td></tr>
</table>

Applied Statistics for Geospatial Data

<table>
<tr><td colspan="2">Module designation
GKP 3001</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Muhammad Kamal, S.Si., M.GIS., Ph.D</td><td colspan="2">Lecturer
Muhammad Kamal, S.Si., M.GIS., Ph.D.
Dr. Bowo Susilo, S.Si., M.T.
Dr.Sc. Sanjiwana Arjasakusuma, S.Si., M.GIS.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain spatial statistics and statistics as an important tool in the analysis of geographical phenomena, especially spatial phenomena
● Able to choose spatial and non-spatial variables to be included in the statistical analysis process
● Able to determine the proper way of statistical analysis in solving spatial problems</td></tr>
<tr><td colspan="4">Content:
This lecture provides understanding and skills in data processing with statistics in supporting studies and research in the field of geographic information science. Students will be provided with the ability to test differences, correlation, determinance, influence tests, and skills in conducting
Spatial Statistics Processing</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (A),
GKP 2301 (A),
GEO 1008 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Taylor, P. J., & Goddard, J. (1974). Geography and statistics: An introduction. Journal of the Royal Statistical Society. Series D (The Statistician), 23(3/4), 149-155.
Weng, Q. (Ed.). (2018). Remote sensing time series image processing. CRC Press.
Kuenzer, C., Dech, S., & Wagner, W. (2015). Remote sensing time series revealing land surface dynamics: Status quo and the pathway ahead (pp. 1-24). Springer International Publishing.
Rogerson, P. A. (2019). Statistical methods for geography: a student's guide. Statistical methods for geography, 1-432.
Kassambara, A., 2017. Practical guide to cluster analysis in R: Unsupervised machine learning (Vol. 1). Sthda.</td></tr>
</table>

Applied Statistics for Geospatial Data (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0001</td><td>Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr.Sc. Sanjiwana Arjasakusuma, S.Si., M.GIS.</td><td colspan="2">Lecturer
Dr.Sc. Sanjiwana Arjasakusuma, S.Si., M.GIS.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to practical spatial statistics and statistics as an important tool in the analysis of geographical phenomena, especially spatial phenomena</td></tr>
<tr><td colspan="4">Content:
Practical courses supporting the theory of Geospatial Data Applied Statistics</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3001 (A/S),
GKP 1202 (A),
GKP 2301 (A),
GEO1008 (A)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Taylor, P. J., & Goddard, J. (1974). Geography and statistics: An introduction. Journal of the Royal Statistical Society. Series D (The Statistician), 23(3/4), 149-155.
Weng, Q. (Ed.). (2018). Remote sensing time series image processing. CRC Press.
Kuenzer, C., Dech, S., & Wagner, W. (2015). Remote sensing time series revealing land surface dynamics: Status quo and the pathway ahead (pp. 1-24). Springer International Publishing.
Rogerson, P. A. (2019). Statistical methods for geography: a student's guide. Statistical methods for geography, 1-432.
Kassambara, A., 2017. Practical guide to cluster analysis in R: Unsupervised machine learning (Vol. 1). Sthda.</td></tr>
</table>

Digital Cartography

<table>
<tr><td colspan="3">Module designation
GKP 3106</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Bowo Susilo, S.Si., M.T.</td><td colspan="3">Lecturer
Dr. Noorhadi Rahardjo, M.Si., P.M.
Dr. Bowo Susilo, S.Si., M.T.
Candra Sari Djati Kartika, S.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to explain the development of digital cartography, both scientifically and technically, as a basis for visualizing geographic data.
● Able to implement digital mapping techniques that suit mapping needs.
● Able to organize and integrate various data sources to compile digital maps and how to disseminate maps.</td></tr>
<tr><td colspan="5">Content:
The Digital Cartography course mainly studies the design and production of cartographic maps using a computer. The material consists of data sources for digital mapping, data models for digital cartographic information. Acquisition and processing of location data, environmental and social data economy. Cartographic digital database concept and production processes in digital mapping.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1101 (P),
GKP 1102 (P),
GKP 2105 (A)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, quiz and written assignments.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Andrienko, et al., 2003, Exploratory Spatio-Temporal Visualization: An Analytical Review, Journal of Languages and Computing, pp. 503-541.
Cromley, Robert G., 1991. Digital Cartography. New Jersey: Prentice Hall.
Jobst, et al., 2010. Preservation in Digital Cartography. Berlin: Springer.
Kraak, M. dan Ormeling, F., 2010. Cartography: Visualization of Geospatial Data (3rd Ed), Harlow: Pearson Education Limited.
Krygier, J., dan Wood, D., 2011, Making Maps: A Visual Guide to Map Design for GIS, New York: The Guilford Press.
Tyner, J., 2010, Principles of Map Design, New York: The Guilford Press.</td></tr>
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Digital Cartography (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0106</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Candra Sari Djati K., S.Si., M.Sc</td><td colspan="3">Lecturer
Candra Sari Djati K., S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to explain, identify and select digital mapping techniques according to mapping objectives
● Able to apply digital geospatial data mapping techniques in solving problems/case studies
● Able to communicate practicum results in writing and verbally</td></tr>
<tr><td colspan="5">Content:
Digital Cartographic Model (DCM), Generalization of Digital Maps, Lettering and Labeling, Preparing the Map Layout, Animated Map, Web Cartography, 3D Visualization</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3106 (A/S),
GKP 1101 (P),
GKP 1102 (P),
GKP 2105 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by presentation of project.</td><td colspan="2">Study and examination requirements:
The students are must attend the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Borden D, Dent, 1999, Carthography Thematic Map Design, Georgia State University, The McGraw Hill Companies, USA
Boss, ES, 1973, Carthographic in Thematic Mapping. Cartographic Department, Enschede, TheNetherland
Judith Tyner, 1992. Introduction to Thematic Carthography. Department of Geographhy California State University, Prentice Hall Englewood Cliffs New Jersey
David J. Cuff and Mark T. Mattdon, 1982, Thematic Maps: Their Design and Production, Methuen. New York and London.</td></tr>
</table>

Remote Sensing of Landscape Ecology

<table>
<tr><td colspan="2">Module designation
GKP 3208</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Drs. Projo Danoedoro, M. Sc., Ph. D.</td><td colspan="2">Lecturer
Drs. Projo Danoedoro, M. Sc., Ph. D.
Dr. Sigit Heru Murti Budi Santosa, S. Si., M. Si.
Dr. Prima Widayani, S. Si., M. Si.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to describe the landscape-ecology approach for regional planning
● Able to understand the landscape-ecology approach for environment monitoring</td></tr>
<tr><td colspan="4">Content:
remote sensing approach for landscape-ecology analysis, land cover classification approach, vegetation analysis using remote sensing, landscape ecology approach for specific landuse, landscape ecology approach for flora and fauna monitoring</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (P),
GEO 1010 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Danoedoro, P. (2007). Versatile Land-Use Information For Local Planning In Indonesia: Contents, Extraction Methods And Integration Based On Moderate-And Highspatial Resolution Satellite Imagery.
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.</td></tr>
</table>

Remote Sensing of Landscape Ecology (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0208</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Prima Widayani, S. Si., M. Si.</td><td colspan="2">Lecturer
Dr. Prima Widayani, S. Si., M. Si.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to interpret landuse/landcover and its landscape characteristics using remote sensing visual and digital methods
● Able to integrate multiple landscape variables to solve landscape-ecological problems using remote sensing and GIS</td></tr>
<tr><td colspan="4">Content:</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion, field observation</td></tr>
<tr><td>Recommended prerequisites
GKP 3208 (A/S),
GKP 2206 (L),
GEO 1010 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td>Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Danoedoro, P. (2007). Versatile Land-Use Information For Local Planning In Indonesia: Contents, Extraction Methods And Integration Based On Moderate-And Highspatial Resolution Satellite Imagery.
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
Sartohadi, J., et al. (2012). Pengantar Geografi Tanah. Yogyakarta: Pustaka Pelajar.
Suharsono, P. (1999). Identifikasi Bentuklahan dan Interpretasi Citra Untuk Geomorfologi. Yogyakarta: PUSPICS Fakultas Geografi Universitas Gadjah Mada.
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.
van Zuidam, R. A. (1983). Guide to Geomorphology Aerial Photographic Interpretation and Mapping. Departement of Geomorphology and Geography, ITC, Netherlands.</td></tr>
</table>

Remote Sensing of Lithosphere

<table>
<tr><td colspan="2">Module designation
GKP 3209</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Drs. Retnadi Heru Jatmiko, M. Sc.</td><td colspan="2">Lecturer
Drs. Retnadi Heru Jatmiko, M. Sc.
Dr. Sandy Budi Wibowo, S. P., M. Sc.
Wirastuti Widyatmanti, S. Si., Ph. D.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the processes of lithosphere with remote sensing data
● Able to understand the usage of remote sensing data for lithospherical studies
● Able to describe landscape characteristics and its physical properties
● Able to understand the application of remote sensing for lithospherical studies</td></tr>
<tr><td colspan="4">Content:
Introduction to remote sensing in lithospherical studies, remote sensing systems for lithospherical studies, lithospheric objects characteristics and interpretation in remote sensing, landscape characteristics and its relation to lithosphere, remote sensing application for lithospherical studies</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (P),
GEL 1101 (A),
GEL 1102 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
Paine, D. P., & Kiser, J. D. (2012). Aerial Photography and Image Interpretation (3rd Edition). Hoboken, NJ: John Wiley & Sons.
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.
van Zuidam, R. A. (1983). Guide to Geomorphology Aerial Photographic Interpretation and Mapping. Departement of Geomorphology and Geography, ITC, Netherlands.</td></tr>
</table>

Remote Sensing of Lithosphere (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0209</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sandy Budi Wibowo, S. P., M. Sc.</td><td colspan="2">Lecturer
Dr. Sandy Budi Wibowo, S. P., M. Sc.
Lab's Assistants</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to describe the characteristics of landform using remote sensing imagery
● Able to demonstrate the usage of aerial imagery for landform characteristic identification</td></tr>
<tr><td colspan="4">Content:
Aerial photo interpretation for geomorphology, landscape and landform characteristics from aerial photographs, landform classification from remote sensing approach</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion, field observation</td></tr>
<tr><td>Recommended prerequisites
GKP 3209 (A/S), GKP 2206 (P), GEL 1101 (A), GEL 1102 (A)</td><td>Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
Paine, D. P., & Kiser, J. D. (2012). Aerial Photography and Image Interpretation (3rd Edition). Hoboken, NJ: John Wiley & Sons.
Suharsono, P. (1999). Identifikasi Bentuklahan dan Interpretasi Citra Untuk Geomorfologi. Yogyakarta: PUSPICS Fakultas Geografi Universitas Gadjah Mada.
Sutanto. 1995. Penginderaan Jauh Dasar. Yogyakarta: Gadjah Mada University Press.
van Zuidam, R. A. (1972). Guide to Geomorphological Photointerpretation. Enschede: International Institute for Aerial Survey and Earth Sciences.</td></tr>
</table>

Spatial Analysis and Modelling

<table>
<tr><td colspan="3">Module designation
GKP 3304</td><td>Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Taufik Hery Purwanto, S.Si., M.Si.</td><td colspan="2">Lecturer
Dr. R. Suharyadi, M.Sc.
Dr. Sigit Heru Murti BS., S.Si., M.Si.
Dr. Taufik Hery Purwanto, S.Si., M.Si.
Dr. Nur Mohammad Farda, S.Si., M.Cs.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz & Assignments: 20%
Mid-term: 40%
Final Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Provide knowledge to students regarding spatial analysis and modeling
● Provide students with an understanding of building conceptual models to solve spatial problems
● Provide an understanding of Contemporary Spatial Analysis and Modeling
● Equip students with applications of spatial analysis and modeling in various resource themes/cases related to regional management and disaster management</td></tr>
<tr><td colspan="4">Content:
spatial modeling concepts, conceptual models to solve spatial problems, common spatial analysis functions, contemporary spatial analysis and modeling, examples and case studies of spatial analysis and modeling</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2302 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, also quiz and written assignments.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Dangermond J., 1983, A Classification of Sofware Components Commonly Used In Geographicc Information Systems, in Design and Implementation of Computer-Based Geographic Information Systems, edited by Donna J. Peuquet and John O'Callaghan, pp 70-91
Longley P.A., et al., 2005, Geographic Information System and Science, 2nd Edition, John Wiley & Sons, Ltd., England
Yuji Murayama Editor, 2012, Progress in Geospatial Analysis, © Springer Japan
Yuji Murayama Editor, 2012, Spatial Analysis and Modeling in Geographical Transformation Process, © Springer Japan
Zeiler M, 1999, Modeling Our World, Environmental Systems Research Institute, Inc.
Smith MJ., Goodchild MF., Longley PA., 2018, Geospatial Analysis (A Comprehensive Guide to Principles Techniques and Software Tools) 6th edition, www.spatialanalysisonline.com</td></tr>
</table>

Spatial Analysis and Modelling (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0304</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
R. Ibnu Rosyadi, S.Si., M.Cs.</td><td colspan="2">Lecturer
R. Ibnu Rosyadi, S.Si., M.Cs.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 20%
Activity: 20%
Self-report: 30%
Mini Project: 30%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to identify geospatial data for overlay, network analysis, 3D analysis, and hydrological modeling
● Able to process geospatial data for overlay, network analysis, 3D analysis, and hydrological modeling
● Able to work independently and in groups to prepare overlay, network analysis, 3D analysis, and hydrological modeling
● Presents the results of overlay, network analysis, 3D analysis, and hydrological modeling</td></tr>
<tr><td colspan="4">Content:
compiling conceptual models to solve spatial problems, common spatial analysis functions, contemporary spatial analysis and modeling</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3304 (A/S),
GKP 2302 (P)</td><td>Type of examination:
The final examinations are conducted by presentation of mini project and self-report.</td><td colspan="2">Study and examination requirements:
Students must submit their self-report completely and attend the presentation of mini project. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Fischer M., Scholten H.J., Unwin D. 2019. Spatial Analytical Perspectives on GIS. Taylor and Francis, London. 256p.
Tambassi T. 2019. The Philosophy of GIS. Springer, Cham. 269p.
Bolstad P. 2019. GIS Fundamentals: A First Text on Geographic Information Systems. XanEdu, Ann Arbor. 764p.
Tian B. 2017. GIS technology applications in environmental and earth sciences. CRC Press. 256 p.
Longley et al. 2015. Geographic Information Science and Systems. John Wiley and Sons. Danvers. 460 p.</td></tr>
</table>

Spatial Programming

<table>
<tr><td colspan="2">Module designation
GKP 3305</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Nur Mohammad Farda, S.Si., M.Cs.</td><td colspan="2">Lecturer
Dr. R. Suharyadi, M.Sc.
Dr. Nur Mohammad Farda, S.Si., M.Cs.
R. Ibnu Rosyadi, S.Si., M.Cs.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz & Skill-based Assessment: 20%
Mid-term: 15%
Final Examination: 15%
Project: 50%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to recognize algorithms and program design in the geospatial field
● Able to undertake spatial programming includes data structures, various operations and algorithms
● Able to determine appropriate spatial programming for image processing and GIS</td></tr>
<tr><td colspan="4">Content:
basic concepts of spatial programming algorithms, programming in image processing and GIS, and creating programs, both in desktop and web based, in the field of image processing and GIS.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2303 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, also quiz and skill-based assessment and mini project in team.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the written examinations and skill-based assessment. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Rauch, G., 2012, Smashing Node.JS JavaScript Everywhere, A John Wiley and Sons Ltd., West Sussex, United Kingdom.
Crickard III, P., 2014, Leaflet.js Essentials, Packt Publishing Ltd., Birmingham, United Kingdom.
Gorelick, N., Hancher, M., Dixon, M., Ilyushchenko, S., Thau, D., & Moore, R. (2017). Google Earth Engine: Planetary-scale geospatial analysis for everyone. Remote Sensing of Environment. https://doi.org/10.1016/j.rse.2017.06.031
Okabe, A., Sugihara, K., 2012, Spatial Analysis along Networks: Statistical and Computational Methods, John Wiley & Sons Ltd., West Sussex, United Kingdom.
Salcido, A., 2011, Cellular Automata – Simplicity Behind Complexity, InTech, Rijeka, Croatia.
Liu, Y., 2009, Modelling Urban Development with Geographic Information Systems and Cellular Automata, Taylor & Francis Group LLC, Boca Raton, FL.
Kramer, O., 2017, Genetic Algorithm Essentials, Springer.
Xiao, N., 2016, GIS Algorithms, SAGE Publications Ltd., London.</td></tr>
</table>

Spatial Programming (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0305</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
5th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
R. Ibnu Rosyadi, S.Si., M.Cs.</td><td colspan="3">Lecturer
R. Ibnu Rosyadi, S.Si., M.Cs.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 20%
Activity: 20%
Self-report: 30%
Mini Project: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to recognize algorithms and program design in the geospatial field
● Able to undertake spatial programming includes data structures, various operations and algorithms
● Able to determine appropriate spatial programming for image processing and GIS</td></tr>
<tr><td colspan="5">Content:
basic concepts of spatial programming algorithms, programming in image processing and GIS, and creating programs, both in desktop and web based, in the field of image processing and GIS.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3305 (A/S), GKP 2303 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by presentation of mini project and self-report.</td><td colspan="2">Study and examination requirements:
Students must submit their self-report completely and attend the presentation of mini project. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Rauch, G., 2012, Smashing Node.JS JavaScript Everywhere, A John Wiley and Sons Ltd., West Sussex, United Kingdom.
Crickard III, P., 2014, Leaflet.js Essentials, Packt Publishing Ltd., Birmingham, United Kingdom.
Gorelick, N., Hancher, M., Dixon, M., Ilyushchenko, S., Thau, D., & Moore, R. (2017). Google Earth Engine: Planetary-scale geospatial analysis for everyone. Remote Sensing of Environment. https://doi.org/10.1016/j.rse.2017.06.031
Okabe, A., Sugihara, K., 2012, Spatial Analysis along Networks: Statistical and Computational Methods, John Wiley & Sons Ltd., West Sussex, United Kingdom.
Salcido, A., 2011, Cellular Automata – Simplicity Behind Complexity, InTech, Rijeka, Croatia.
Liu, Y., 2009, Modelling Urban Development with Geographic Information Systems and Cellular Automata, Taylor & Francis Group LLC, Boca Raton, FL.
Kramer, O., 2017, Genetic Algorithm Essentials, Springer.
Xiao, N., 2016, GIS Algorithms, SAGE Publications Ltd., London.</td></tr>
</table>

Research Methods in Geographic Information Science

<table>
<tr><td colspan="3">Module designation
GKP 3002</td><td>Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Drs. Projo Danoedoro, M.Sc., Ph.D.</td><td colspan="2">Lecturer
Drs. Projo Danoedoro, M.Sc., Ph.D.
Dr. Sigit Heru Murti BS., S.Si., M.Si.
Dr. Noorhadi Rahardjo, M.Si., P.M.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the position of the study of Geographic Information Science in the context of geographic studies, along with their differences and similarities with other non-geographical spatial studies
● Able to determine the spatial variables involved in a geographical study, and determine the sources of data as well as how they are collected
● Able to determine the appropriate way of analysis for various spatial variables, either in the way of information reduction, visualization and how to integrate it to solve the problem
● Able to show recognition of the work / findings of others who are used as a basis in literature review and synthesis
● Able describe logical thinking patterns to solve spatial problems through the preparation of methods and steps of work in a structured / systematic in the form of writing</td></tr>
<tr><td colspan="4">Content:
a review of the development of geographical scientific philosophy, especially through the perspective of the development of spatial analysis and paradigms in geography, geographic information science as automated geography, various approaches and methods in cartography, remote sensing, and GIS. Developing a proposal: background, formulating the problem, asking research questions and hypotheses, objectives, building a framework, methods and designing a research schedule, post-field data analysis, modeling and model accuracy testing and prepare the final report.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Gatrell, J.D., Bierly, G.D., Jensen, R.R. (2005). Research Design and Proposal Writing in Spatial Science. Berlin: Springer
Jensen, JR 2007, Remote Sensing of the Environment: An Earth Resource Perspective (2nd edition), Pearson</td></tr>
</table>

Prentice Hall, New Jersey.
Campbell, JB 2002, Introduction to Remote Sensing (3rd ed), The Guilford Press, New York.
Kerle, N, Janssen, LLF & Huurneman, GC (eds) 2004, Principles of Remote Sensing, ITC, Enschede.
Sutanto 2013, Metode Penelitian Penginderaan Jauh, BPFG UGM, Yogyakarta

Management of Surveying and Mapping

<table>
<tr><td colspan="2">Module designation
GKP 3107</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Noorhadi Rahardjo, M.Si., P.M.</td><td colspan="2">Lecturer
Dr. Noorhadi Rahardjo, M.Si., P.M.
Dr. Sudaryatno, M.Si.
Dr. Bowo Susilo, S.Si., M.T.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz & Assignments: 20%
Mid-term: 40%
Final Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to make the planning of survey and mapping activity based on terms of reference.
● Able to manage the resources needed in an survey and mapping activity in order to be effective and efficient.
● Able to supervise survey and mapping activity which is oriented to maintain the quality of the work.</td></tr>
<tr><td colspan="4">Content:
Planning the activity, understanding term of reference, resource management, determining the appropriate methods, composing proposal, scheduling and budgeting, and control quality.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2105 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Campbell, John. 1998. Map Use & Analysis (3rd edition). New York : McGraw-Hill
Departemen Kehutanan. 1986. Petunjuk Pelaksanaan dan Penyusunan Rencana Teknik Lapangan Rehabilitasi Lahan dan Konservasi Tanah; Pedoman Pola Rehabilitasi Lahan dan Konservasi Tanah Daerah Aliran Sungai. Jakarta : Direktorat Jenderal Reboisasi dan Rehabilitasi Lahan, Dephut
Maling, D.H. 1989. Measurements From Maps ; principles and methods of cartometry. Oxford : Pergamon Press
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J. 2010. Map Use (Reading, Analysis, and Interpretation). New York : Esri Press.
Robinson, Arthur H., et al. 1995. Elements of Cartography (6th edition). New York : John Wiley & Sons, Inc</td></tr>
</table>

Management of Surveying and Mapping (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0107</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Totok Wahyu Wibowo, S.Si., M.Sc.</td><td colspan="3">Lecturer
Totok Wahyu Wibowo, S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
• Preparation: 2 hrs
• Working on results: 16 hrs
• Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
• To have skill in planning survey and mapping activity based on legal foundation and standard documents.
• To have capability in establishing organization and method for the implementation of survey and mapping activity
• To be able to conduct scheduling, monitoring, and controlling the survey and mapping activity</td></tr>
<tr><td colspan="5">Content:
Legal foundation of survey and mapping activity, organizational structure, implementation methods, scheduling and budgeting, monitoring and controlling, and the use of technology in mapping and survey activity.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3107 (A/S),
GKP 2105 (P)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Campbell, John. 1998. Map Use & Analysis (3rd edition). New York : McGraw-Hill
Departemen Kehutanan. 1986. Petunjuk Pelaksanaan dan Penyusunan Rencana Teknik Lapangan Rehabilitasi Lahan dan Konservasi Tanah; Pedoman Pola Rehabilitasi Lahan dan Konservasi Tanah Daerah Aliran Sungai. Jakarta : Direktorat Jenderal Reboisasi dan Rehabilitasi Lahan, Dephut
Maling, D.H. 1989. Measurements From Maps ; principles and methods of cartometry. Oxford : Pergamon Press
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J. 2010. Map Use (Reading, Analysis, and Interpretation). New York : Esri Press.
Robinson, Arthur H., et al. 1995. Elements of Cartography (6th edition). New York : John Wiley & Sons, Inc</td></tr>
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Fieldwork 3: Geospatial Analysis and Modelling

<table>
<tr><td colspan="2">Module designation
GKP 3003</td><td colspan="2">Credits
3 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Lecturers Team</td><td colspan="2">Lecturer
Dr. Sudaryatno, M.Si.
Dr. Sigit Heru Murti BS., S.Si., M.Si.
Dr. Retnadi Heru Jatmiko, M.Sc.
Wirastuti Widyatmanti, S.Si., Ph.D.
Dr. Prima Widayani, S.Si., M.Si.
Ibnu Rosyadi S.Si., M.Cs.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Proposal: 30%
Field work activity: 40%
Final Report: 30%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 42 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 42 hrs
● Literature study: 42 hrs
● Preparation for tests and examination: 42 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the position of the study of Saig in the context of geographic studies, together with their differences and similarities with other non-geocentical spatial studies
● Able to determine the spatial variables involved in a geographical study, and determine the sources of data as well as how they are collected
● Able to determine the appropriate way of analysis for various spatial variables, either in the way of information reduction, visualization and how to integrate it to solve the problem
● Able to show recognition of the work / findings of others who are used as a basis in literature review and synthesis
● Able to describe logical thinking patterns to solve spatial problems through the preparation of methods and steps of work in a structured / systematic in the form of writing</td></tr>
<tr><td colspan="4">Content:
This field course is specifically designed for third-year KPJ students, with the aim of provide practical provisions for research applications in the field of geographic information science in real time in field.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites</td><td colspan="2">Type of examination:
The examinations consist of presentation of proposal and final report, and field activity assessment.</td><td>Study and examination requirements:
The students must attend the field activity and presentation. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D.</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:</td></tr>
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Analytical Cartography

<table>
<tr><td colspan="2">Module designation
GKP 3108</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Bowo Susilo, S.Si., M.T.</td><td colspan="2">Lecturer
Dr. Bowo Susilo, S.Si., M.T.
Dr. Noorhadi Rahardjo, M.Si., P.M.
Totok Wahyu Wibowo, S.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the concept and theory of spatial analysis.
● Able to choose geospatial data analysis techniques (especially maps) that match the dimensions of mapped data
● Able to implement map analysis and map interpretation to solve geographical problems.</td></tr>
<tr><td colspan="4">Content:
Definition and development of analytical cartography, digital data structure, cartometric, basic spatial data analysis, spatial point data analysis, network analysis, application of analytical cartography, current research in analytical cartography.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2105 (P)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Campbell, John. 1988. Map Use & Analysis. McGraw-Hill : New York
Haining, R., 2004, Spatial Data Analysis: Theory and Practice, Cambrodge: Cambridge University Press.
Kraak, M. and Ormeling, F. 2010. Cartography: Visualization of Spatial Data. Essex: Pearson Education Limited.
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J. 2010. Map Use (Reading, Analysis, and Interpretation). New York : Esri Press.
Lloyd, C., 2010, Spatial Data Analysis: An Introduction for GIS Users, New York: Oxford Academic Press.
O'Sullivan, D. and Unwin, D. , 2010, Geographic Information Analysis, 2nd Edition, New York: John Wiley & Sons.
Robinson, A. H, et al. 1995. Elements of Cartography. New York : John Wiley & Sons
Worthington, B.D.R. 1982. Techniques In Map Analysis. London : Macmillan Education.</td></tr>
</table>

Analytical Cartography (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0108</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Candra Sari Djati K., S.Si., M.Sc.</td><td colspan="3">Lecturer
Candra Sari Djati K., S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Assignments: 10%
Examination: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● To have capability to do basic map measurement, i.e horizontal and vertical position (relative and absolute), distance measurement, and area measurement.
● To have capability to do cartometric measurements in the map.
● To have capability to do spatial distribution analysis on point object in the map
● To have capability to perform spatial association analysis among objects in the map</td></tr>
<tr><td colspan="5">Content:
Cartometric (position, distance, area), slope map, profile, gradient of slope, shape index, spatial pattern analysis, network connectivity, spatial association analysis.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3108 (A/S),
GKP 2105 (P)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and skill test.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Campbell, John. 1988. Map Use & Analysis. McGraw-Hill : New York
Haining, R., 2004, Spatial Data Analysis: Theory and Practice, Cambrodge: Cambridge University Press.
Kraak, M. and Ormeling, F. 2010. Cartography: Visualization of Spatial Data. Essex: Pearson Education Limited.
Kimerling, J., Buckley, A., Muehrcke, P., and Muehrcke, J. 2010. Map Use (Reading, Analysis, and Interpretation). New York : Esri Press.
Lloyd, C., 2010, Spatial Data Analysis: An Introduction for GIS Users, New York: Oxford Academic Press.
O'Sullivan, D. and Unwin, D. , 2010, Geographic Information Analysis, 2nd Edition, New York: John Wiley & Sons.
Robinson, A. H, et al. 1995. Elements of Cartography. New York : John Wiley & Sons
Worthington, B.D.R. 1982. Techniques In Map Analysis. London : Macmillan Education.</td></tr>
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Remote Sensing of Hydrology and Watershed Management

<table>
<tr><td colspan="2">Module designation
GKP 3210</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sigit Heru Murti BS., S.Si., M.Si.</td><td colspan="2">Lecturer
Dr. Sigit Heru Murti BS., S.Si., M.Si.
Wirastuti Widyatmanti, S.Si., PhD.
Dr. Sudaryatno, M.Si.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the concept of geographic information science for applied hydrology
● Able to apply concepts and methods in geographic information science in interpreting and analyzing hydrosphere objects and phenomena
● Able to understand the application of methods in geographic information science to hydrosphere objects and phenomena</td></tr>
<tr><td colspan="4">Content:
basic concepts of surface water hydrology, groundwater hydrology, watershed (DAS) management, and remote sensing applications for hydrology, also the role of remote sensing data for hydrological inventory and analysis.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (P),
GEL 1202 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Jensen, J. R. (2014). Remote sensing of the environment an earth resource perspective (Second edition ed.). Harlow: Pearson.
Hong, Y., Zhang, Y., & Khan, S. (Eds.). (2016). Hydrologic Remote Sensing: Capacity Building for Sustainability and Resilience (1st ed.). CRC Press. https://doi.org/10.1201/9781315370392
Chang, N.-B., & Hong, Y. (Eds.). (2012). Multiscale Hydrologic Remote Sensing: Perspectives and Applications (1st ed.). CRC Press. https://doi.org/10.1201/b11279
Yangbo, C., Takara, K., Cluckie, ID., & De Smedt, EH. (2004). GIS and Remote Sensing in Hydrology, Water Resources and Environment. IAHS Publication 289.
Nicolas Baghdadi and Mehrez Zribi. (2016). Land Surface Remote Sensing in Continental Hydrology (1st. ed.). ISTE Press - Elsevier, London/Oxford, GBR.</td></tr>
</table>

Remote Sensing of Hydrology and Watershed Management (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0210</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Wirastuti Widyatmanti, S.Si., PhD.</td><td colspan="2">Lecturer
Wirastuti Widyatmanti, S.Si., PhD.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Presentation: 40%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to apply concepts and methods in geographic information science in interpreting and analyzing hydrosphere objects and phenomena
● Able to understand the application of methods in geographic information science to hydrosphere objects and phenomena</td></tr>
<tr><td colspan="4">Content:
remote sensing applications for hydrology, method of remote sensing data for hydrological inventory and analysis</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3210 (A/S),
GKP 2206 (P)</td><td>Type of examination:
The final examinations are conducted by presentation of mini project and self-report.</td><td colspan="2">Study and examination requirements:
Students must present their mini project in team and complete their self-report. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Jensen, J. R. (2014). Remote sensing of the environment an earth resource perspective (Second edition ed.). Harlow: Pearson.
Hong, Y., Zhang, Y., & Khan, S. (Eds.). (2016). Hydrologic Remote Sensing: Capacity Building for Sustainability and Resilience (1st ed.). CRC Press. https://doi.org/10.1201/9781315370392
Chang, N.-B., & Hong, Y. (Eds.). (2012). Multiscale Hydrologic Remote Sensing: Perspectives and Applications (1st ed.). CRC Press. https://doi.org/10.1201/b11279
Yangbo, C., Takara, K., Cluckie, ID., & De Smedt, EH. (2004). GIS and Remote Sensing in Hydrology, Water Resources and Environment. IAHS Publication 289.
Nicolas Baghdadi and Mehrez Zribi. (2016). Land Surface Remote Sensing in Continental Hydrology (1st. ed.). ISTE Press - Elsevier, London/Oxford, GBR.</td></tr>
</table>

Remote Sensing for Urban Survey

<table>
<tr><td colspan="3">Module designation
GKP 3211</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. R. Suharyadi, M.Sc</td><td colspan="3">Lecturer
Dr. R. Suharyadi, M.Sc
Dr. Prima Widayani, M.Si
Dr. Iswari Nur Hidayati, M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to explain urban phenomena and interpret spatial data for urban as a basis for studying geospatial phenomena
● Able to identify and choose to analyze geospatial data to solve urban problems
● Able to use geospatial information technology for urban data analysis</td></tr>
<tr><td colspan="5">Content:
urban land use analysis, land consolidation analysis, settlement quality studies, housing selection studies, site selection, urban green open spaces, and regional spatial planning.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (P)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Bracken, Ian. 1981. Urban Planning Methods: Research and Policy Analysis. London: Metheum & Co.Ltd
Branch, Melville C. 1995. Perencanaan Kota Komprehensif Pengantar dan Penjelasan (terjemahan). Yogyakarta : Gadjah Mada University Press
Catanese, Anthony J. and Cnyder, James C. 1989. Perencanaan Kota (terjemahan). Jakarta: Penerbit Erlangga
Clark, David. 1996. Urban World/ Global City. London and New York: Routledge
Cherry, Gordon E. 1974. Urban Planning Problems. London: Leonard Hill Books
Hardin, P.J.; Jackson, M.W.; Otterstrom, S.M. Mapping, measuring, and modeling urban growth. In Geo-Spatial Technologies in Urban Environments: Policy, Practice, and Pixels, 2nd ed.; Jensen, R.R., Gatrell, J.D., McLean, D.D., Eds.; Springer-Verlag: Berlin, Germany, 2007; pp. 141-176.</td></tr>
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Remote Sensing for Urban Survey (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0211</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Iswari Nur Hidayati, M.Sc.</td><td colspan="2">Lecturer
Dr. Iswari Nur Hidayati, M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Activity: 20%
Self-report: 30%
Presentation: 40%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to interpret spatial data for urban data analysis
● Able to identify and choose to analyze geospatial data to solve urban problems
● Able to work individually or in groups in geospatial analysis using remote sensing and GIS to explain urban-related problems for professional project management</td></tr>
<tr><td colspan="4">Content:
Visual interpretation of land use and settlement blocks, image pan-sharpening for urban studies, settlement quality studies, housing selection studies, site selection, urban green open spaces</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3211 (A/S),
GKP 2206 (P)</td><td>Type of examination:
The final examinations are conducted by presentation of mini project and self-report.</td><td colspan="2">Study and examination requirements:
Students must present their mini project in team and complete their self-report. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Bracken, Ian. 1981. Urban Planning Methods: Research and Policy Analysis. London: Metheum & Co.Ltd
Branch, Melville C. 1995. Perencanaan Kota Komprehensif Pengantar dan Penjelasan (terjemahan). Yogyakarta : Gadjah Mada University Press
Catanese, Anthony J. and Cnyder, James C. 1989. Perencanaan Kota (terjemahan). Jakarta: Penerbit Erlangga
Clark, David. 1996. Urban World/ Global City. London and New York: Routledge
Cherry, Gordon E. 1974. Urban Planning Problems. London: Leonard Hill Books
Hardin, P.J.; Jackson, M.W.; Otterstrom, S.M. Mapping, measuring, and modeling urban growth. In Geo-Spatial Technologies in Urban Environments: Policy, Practice, and Pixels, 2nd ed.; Jensen, R.R., Gatrell, J.D., McLean, D.D., Eds.; Springer-Verlag: Berlin, Germany, 2007; pp. 141-176.</td></tr>
</table>

Spatial Data Mining

<table>
<tr><td colspan="2">Module designation
GKP 3306</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Nur Mohammad Farda, S.Si., M.Cs.</td><td colspan="2">Lecturer
Dr. Nur Mohammad Farda, S.Si., M.Cs.
Dr. Sc. Sanjiwana Arjasakusuma, M.GIS
R. Ibnu Rosyadi, S.Si., M.Cs.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz & Skill-based Assessment: 20%
Mid-term: 40%
Final Examination: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the concept of Spatial Data Mining and its position in geography.
● Able to identify and select appropriate Spatial Data Mining techniques for geographic application themes.
● Able to apply Spatial Data Mining methods and techniques to solve geographic problems.</td></tr>
<tr><td colspan="4">Content:
concepts and theories of spatial data, concepts and introduction to data mining, data mining processes, evaluation and validation of data mining, methods and algorithms, as well as types of data mining research.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (A),
GKP 3304 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, also quiz and written assessment.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the written examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Han, J., Kamber, M., 2006, Data Mining: Concepts and Techniques 2nd edition, Morgan Kaufmann Publishers, Elsevier, San Francisco CA.
Miller, H.J., Han, J., 2009, Data Mining and Knowledge Discovery 2nd Edition, Taylor & Francis Group, LLC, Boca Rotan FL.
Stein, A., Wenzhong, S., Bijker, W., 2009, Quality Aspect in Spatial Data Mining, CRC Press, Taylor & Francis Group, LLC, Boca Rotan FL.
Miller, H.J., Han., J. (Editors), 2009, Geographic Data Mining and Knowledge Discovery 2nd ed., Taylor & Francis Group, LLC, Boca Rotan FL.
Li, D., Wang, S., Li, D., 2015, Spatial Data Mining, Springer, Berlin, Heidelberg.</td></tr>
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Spatial Data Mining (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0306</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
6th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sc. Sanjiwana Arjasakusuma, M.GIS</td><td colspan="3">Lecturer
Dr. Sc. Sanjiwana Arjasakusuma, M.GIS
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 20%
Activity: 10%
Assignment: 20%
Self-report: 30%
Final Assessment: 20%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to recognize spatial data mining steps and data pre-processing processes (data cleaning and filtering) before the spatial data mining process
● Able to identify differences in data characteristics and carry out processing to equalize data levels to carry out data integration in the spatial data mining process
● Able to carry out image mining processes with classification tasks using decision tree learning such as decision trees and random forests
● Able to carry out the tuning process to optimize the output performance model in the image mining process for classification
● Able to carry out image mining for predictions using logistic regression with spatial data input
● Able to derive spatio-temporal patterns and trends from point vector and raster data
● Able to carry out the image mining process using the Google Earth Engine platform</td></tr>
<tr><td colspan="5">Content:
Data cleaning, spatial data integration, image mining using tree-based algorithm, support vector machine dan Random forest, logistic regression, spatial pattern from point big data, GEE</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3306 (A/S),
GKP 2206 (A),
GKP 3304 (A</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and self-report.</td><td colspan="2">Study and examination requirements:
Students must submit their self-report completely and attend the final assessment. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Mohri, M., Rostamizadeh, A., & Talwalkar, A. (2018). Foundations of machine learning. MIT press.
Kuhn, M. (2015). A Short Introduction to the caret Package. R Found Stat Comput, 1, 1-10.
Srivastava, A. N., Nemani, R., & Steinhaeuser, K. (Eds.). (2017). Large-Scale Machine Learning in the Earth Sciences. CRC Press.</td></tr>
</table>

Research Proposal

<table>
<tr><td colspan="3">Module designation
GKP 4001</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td colspan="2">Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. R. Suharyadi, M.Sc.</td><td colspan="3">Lecturer
Dr. R. Suharyadi, M.Sc.
Dr. Nurul Khakim, M.Si.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz: 5%
Assignments: 5%
Mid-term: 45%
Examination: 45%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
• To get knowledge of essential substance in making research proposal, particularly in the field of cartography, remote sensing, and geographic information system.
• To get knowledge on how to compose research background, problem formulation, research goal, and methods.</td></tr>
<tr><td colspan="5">Content:
Procedure of making undergradute thesis, research background, problem formulation, research goal, theoretical review, research framework, and research method.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td colspan="2">Type of examination:
Examinations form is testing which implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Etty Indriati. 2001. Menulis Karya Ilmiah : Artikel, Skripsi, Tesis, Disertasi. Jakarta : PT Gramedia Pustaka Utama
Fakultas Geografi. 2005. Pedoman Penulisan Usulan Penelitian dan Skripsi. Yogyakarta: Badan Penerbit Fakultas Geografi UGM.
Ida Bagoes Mantra. 2000. Langkah-langkah Penelitian Survei, Usulan Penelitian, dan Laporan Penelitian. Yogyakarta : Badan Penerbit Fakultas Geografi UGM
Masri Singarimbun dan Sofian Effendi. 1987. Metode Penelitian Survei. Jakarta : LP3ES
Tim Fakultas Geografi. 2004. Pedoman Penulisan Usulan Penelitian untuk Skripsi Fakultas Geografi Universitas Gadjah Mada. Yogyakarta: Badan Penerbit Fakultas Geografi UGM.</td></tr>
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Research Proposal Seminar

<table>
<tr><td colspan="3">Module designation
GKP 4002</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td colspan="2">Relation to curriculum</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
-</td><td colspan="3">Lecturer
All Teaching Staffs</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Written Proposal and Presentation: 100%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 14 hrs</td><td colspan="2">Student’s self-study time:
● Assignments by lecturer: 14 hrs
● Literature study: 14 hrs
● Preparation for tests and examination: 14 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
Able to deliver their research proposal, both in verbal and written, in accordance with the final assignment writing systematics.</td></tr>
<tr><td colspan="5">Content:
Presentation of research proposal</td></tr>
<tr><td colspan="5">Teaching methods:
-</td></tr>
<tr><td>Recommended prerequisites
GKP 4001 (P)</td><td colspan="2">Type of examination:
Examinations form is test session which attended and reviewed by teams of lecturer according to the topics of research.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must submit a draft proposal and attend a research proposal seminar and get a minimum grade of C.</td></tr>
<tr><td colspan="5">Media:
White board, PowerPoint Presentations, Projector</td></tr>
<tr><td colspan="5">Reading list:</td></tr>
</table>

Visualization of Geospatial Information

<table>
<tr><td colspan="2">Module designation
GKP 4110</td><td colspan="2">Credits
3 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Bowo Susilo, S.Si., M.T.</td><td colspan="2">Lecturer
Dr. Bowo Susilo, S.Si., M.T.
Dr. Noorhadi Rahardjo, M.Si., P.M.
Dr. Nurul Khakhim, M.S.
Candra Sari Djati Kartika, S.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment & Quiz: 20%
Mid-term: 40%
Examination: 40%</td><td colspan="2">Workload Total: 126 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 42 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 42 hrs
● Literature study: 42 hrs
● Preparation for tests and examination: 42 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
• Able to explain the concept of Geospatial Information Visualization and its relevance to the field of Geographic Information Science
• Able to choose approaches, methods and techniques of Geospatial Information Visualization in accordance with the functions, objectives and needs of users of geospatial information
• Able to apply knowledge and skills of Geospatial Information Visualization to solve geographical problems (paying attention to communication functions and analytical functions</td></tr>
<tr><td colspan="4">Content:
Basic concept of geovisualization, Geographical Phenomena, Geospatial Data and Geospatial Information, Functions and Objectives of geovisualization, Approaches and Methods in geovisualization, Methods and Techniques in geovisualization, Marine Cartography, Web Cartography</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2105 (P),
GKP 3106 (A),
GKP 3108 (A),
GKP 1202 (A),
GKP 2301 (A</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td>Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
ICA. 2020. Marine Cartography Working Group.
Keim, D.A., 2002, Information Visualization and Visual Data Mining, IEEE Transactions on Visualization and Computer Graphics, Vol. 7, No. 1
Keim, D.C., Panse, C., and Sips, M., 2005, Information Visualization: Scope, Techniques and Opportunities for Geovisualization. Elsevier
Kraak, M.-J., & Ormeling, F. (2010). Cartography: Visualization of Geospatial Data (3rd ed.). Essex, UK: Pearson Education.
Laurini, R., 2017, Geovisualization and Chorems dalam Geographic Knowledge Infrastructure, ISTE Press – Elsevier
Nöllenburg, M. (2007). Geographic Visualization. Lecture Notes in Computer Science, vol 4417. Springer, Berlin</td></tr>
</table>

Visualization of Geospatial Information (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0110</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Candra Sari Djati K., S.Si., M.Sc.</td><td colspan="2">Lecturer
Candra Sari Djati K., S.Si., M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest and Assignments: 20%
Activity: 10%
Self-report: 30%
Mini Projects: 40%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain, identify and choose geospatial data visualization methods in accordance with mapping objectives
● Able to apply the concept of geovisualization in solving problems case studies individually/in groups
● Able to communicate practicum results in writing or verbally</td></tr>
<tr><td colspan="4">Content:
Infographic, Tactile Map, Atlas, Digital Storytelling with StoryMap, Spatio-Temporal Visualization</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 3108 (A/S),
GKP 2105 (P)</td><td colspan="2">Type of examination:
The final examinations are conducted by presentation of mini project and individual self-report.</td><td>Study and examination requirements:
The students must submit and present their projects and their self-reports. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Andrienko, et al., 2008, Geovisualization of Dynamic, Movement and Change: Key Issues and Developing Approach in Visualization Research, Information Visualization, pp.173-180.
Dykes, J., Andrienko, G., Andrienko, N., Paelke, V., Schiewe, J., 2010, GeoVisualization and The Digital City, Computers, Environment and Urban Systems, pp. 443–451.
Kraak, M. dan Ormeling, F., 2010. Cartography: Visualization of Geospatial Data (3rd Ed), Harlow: Pearson Education Limited.
Krygier, J., dan Wood, D., 2011, Making Maps: A Visual Guide to Map Design for GIS, New York: The Guilford Press.
MacEachren, A. and Taylor, D.R.F., 1999, Visualization in Modern Cartography (2nd Ed), Oxford : Pergamon/Elsevier Science Ltd.
Nöllenburg, M., 2007, Chapter 6 Geographic Visualization, in: A. Kerren et al. (Eds.): Human-Centered Visualization Environments 2006, LNCS 4417, pp. 257–294.</td></tr>
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Image-Based Terrain Analysis and Evaluation

<table>
<tr><td colspan="2">Module designation
GKP 4212</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Drs. Projo Danoedoro, M.Sc., Ph. D.</td><td colspan="2">Lecturer
Drs. Projo Danoedoro, M.Sc., Ph. D.
Wirastuti Widyatmanti, S.Si. PhD
Dr. Sandy Budi Wibowo, S.P., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment: 10%
Mid-term: 45%
Examination: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the concept of terrain as a complex unity of physical features on the surface and near the surface of the earth, as well as its relationship with various attributes or biophysical properties as the basis for area management.
● Able to formulate logical relationships between terrain units and field spatial characteristics, including rock, soil, hydrology and vegetation aspects, with the resolution and scale of various geospatial images and data.
● Able to determine how to process, analyze and interpret various geospatial data to derive information related to terrain characteristics, until it becomes a map.
● Able to determine various methods of analysis, evaluation and classification of terrain based on geospatial data to solve geographical problems.</td></tr>
<tr><td colspan="4">Content:
The concept of terrain, its similarities and differences with land, landforms, physiology, and soil, terrain as the physical unity of the land expressed by its physiographic and morphological features, terrain classification as a function of mapping scale and imagery of corresponding data sources, topographic characterization in terrain analysis, extraction of terrain attribute information from DEM, terrain analysis for a wide range of applications.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 3209 (A),
GKP 3304 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Davidson, D. (ed) (1986). Land Evaluation. New York: Van Nostrand Rheinhold.
Demers M. (2008). Fundamentals of Geographic Information Systems, 2md edition. New York: joh Wiley and Sons.
Eastman, R. (2014). IDRISI Manual. Worchester: Clark Labs.
Hardjowigeno, S. (2015). Ilmu Tanah. Jakarta: Akademika Pressindo
Hugget, R. dan Cheesman, J. (2002). Topography and the Environment. Edinburgh: Pearson Education</td></tr>
</table>

Lillesand, T.M., Kiefer, R.W., dan Chipman, J. (2014). Remote Sensing and Image Interpretation, 6th edition. New York: John Wiley and Sons

McKenzie, N.J., Grundy, M.J., Webster, R., dan Ringrose-Viase, A.J. (2008). Guidelines for Surveying Soil and Land Resources, 2nd edition. Collingwood, VIC: CSIRO Publishing

Strahler, A.N. dan Strahler, A.H. (1980) Introducing Physical Geography. New York: John Wiley and Sons

Townshend, J.R.G. (ed) (1981). Terrain Analysis and Remote Sensing. New York: John Wiley and Sons

Van Zuidam, R.A., and van Zuidam-Cancelado, F.I. (1983). Terrain Analysis and Classification using Aerial Photographs. Enschede: International Institute for Aerospace Survey and Earth Sciences

Zonneveld, I. S. (2001). Introduction. In I. S. Zonneveld, and van der Zee, D. (Ed.), Landscape Ecology Aplied in Land Evaluation, Development and Conservation Some Worldwide Examples. ITC Publication Number 81/ IALE Publication Number MM-1.Enschede: ITC/International Association for Land Evaluation

Image-Based Terrain Analysis and Evaluation (practicum)

<table>
<tr><td colspan="2">Module designation
GKP 0212</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Drs. Projo Danoedoro, M.Sc., Ph. D.</td><td colspan="2">Lecturer
Drs. Projo Danoedoro, M.Sc., Ph. D.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Self-report: 80%
Final exam: 10%</td><td colspan="2">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td>Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to formulate logical relationships between terrain units and field spatial characteristics, including rock, soil, hydrology and vegetation aspects, with the resolution and scale of various geospatial images and data.
● Able to determine how to process, analyze and interpret various geospatial data to derive information related to terrain characteristics, until it becomes a map.
● Able to determine various methods of analysis, evaluation and classification of terrain based on geospatial data to solve geographical problems.</td></tr>
<tr><td colspan="4">Content:
Review of the relationship between image appearance and geological maps, Synoptic overview and logical deduction, Manual/visual interpretation of imagery, Field observation and measurement, Parameter measurement techniques with GIS raster software, Build a DEM, Modeling of biophysical phenomena through DEM-based field analysis and optical imagery, Build distributed models for soil and/or hydrology</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 4212 (A/S),
GKP 3209 (A),
GKP 3304 (A)</td><td>Type of examination:
The final examinations are conducted by interview and self-report.</td><td colspan="2">Study and examination requirements:
Students must present their mini project in team and complete their self-report. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="4">Reading list:
Davidson, D. (ed) (1986). Land Evaluation. New York: Van Nostrand Rheinhold.
Demers M. (2008). Fundamentals of Geographic Information Systems, 2nd edition. New York
Hardjowigeno, S. (2015). Ilmu Tanah. Jakarta: Akademika Pressindo
Hugget, R. dan Cheesman, J. (2002). Topography and the Environment. Edinburgh: Pearson Education
Lillesand, T.M., Kiefer, R.W., dan Chipman, J. (2014). Remote Sensing and Image Interpretation, 6th edition. New York: John Wiley and Sons
McKenzie, N.J., Grundy, M.J., Webster, R., dan Ringrose-Viase, A.J. (2008). Guidelines for Surveying Soil and Land Resources, 2nd edition. Collingwood, VIC: CSIRO Publishing
Townshend, J.R.G. (ed) (1981). Terrain Analysis and Remote Sensing. New York: John Wiley and Sons
Van Zuidam, R.A., and van Zuidam-Cancelado, F.I. (1983). Terrain Analysis and Classification using Aerial Photographs. Enschede: International Institute for Aerospace Survey and Earth Sciences</td></tr>
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Coastal and Ocean Remote Sensing

<table>
<tr><td colspan="2">Module designation
GKP 4213</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Muhammad Kamal, MGIS, Ph.D.</td><td colspan="2">Lecturer
Muhammad Kamal, MGIS, Ph.D.
Wirastuti Widyatmanti, S.Si., Ph.D.
Dr. Pramaditya Wicaksono, M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz and Assignment: 30%
Mid-term: 40%
Final Exam: 20%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the management of coastal and marine geospatial data and information using remote sensing.
● Able to explain the concept and process of digital image processing for mapping benthic habitats, bathymetry, mangroves, and seawater quality using remote sensing.
● Able to explain field data collection survey techniques for mapping benthic habitats, bathymetry, mangroves, and seawater quality using remote sensing.</td></tr>
<tr><td colspan="4">Content:
the concept of coastal and ocean, the scope of remote sensing for coastal and oceanic studies, the legal aspects of coastal and oceanic studies, the basic concept of a remote sensing approach to coastal and oceanic studies and selected applied examples of remote sensing for coastal and oceanic studies.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (P),
GEL 2108 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, quiz and mini projects.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Goodman, J. A., Purkis, S. J., & Phinn, S. R. (2013). Coral Reef Remote Sensing A Guide for Mapping, Monitoring and Management. (S. R. Phinn, Ed.) Springer.
Green, E. P., Mumby, P. J., Edwards, A. J., & Clark, C. D. (2000). Remote Sensing Handbook for Tropical Coastal Management. Coastal Management Sourcebooks 3. (A. J. Edwards, Ed.) Paris: UNESCO.
Jensen, J. R. (2006). Remote Sensing of the Environment. An Earth Resource Perspective. (K. E. Clarke, Ed.) Prentice Hall.
Kuenzer, C., Bluemel, A., Gebhardt, S., Vo Quoc, T., & Dech, S. (2011). Remote Sensing of Mangrove Ecosystems: A Review. Remote Sensing, 3, 878-928.
Heumann, B. W. (2011). Satellite remote sensing of mangrove forests: recent advances and future opportunities. Progress in Physical Geography, 35(1), 87-108. doi: 10.1177/0309133310385371
Lucas, R., Lule, A. V., Rodríguez, M. T., Kamal, M., Thomas, N., Asbridge, E., & Kuenzer, C. (2017). Spatial</td></tr>
</table>

Ecology of Mangrove Forests: A Remote Sensing Perspective. In V. H. Rivera-Monroy, S. Y. Lee, E. Kristensen & R. R. Twilley (Eds.), *Mangrove Ecosystems: A Global Biogeographic Perspective: Structure, Function, and Services* (pp. 87-112). Cham: Springer International Publishing.

Kamal, M., Phinn, S., & Johansen, K. (2016). Assessment of multi-resolution image data for mangrove leaf area index mapping. Remote Sensing of Environment, 176, 242-254. doi: http://dx.doi.org/10.1016/j.rse.2016.02.013

Marten, S. (2004). An Introduction to Ocean Remote Sensing. Cambridge: Cambridge University Press.

Coastal and Ocean Remote Sensing (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0213</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Pramaditya Wicaksono, M.Sc.</td><td colspan="3">Lecturer
Dr. Pramaditya Wicaksono, M.Sc.
Lab's Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 10%
Self-report: 80%
Final exam: 10%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student's self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to execute the process of digital image processing for mapping benthic habitats, bathymetry, mangroves, and seawater quality using remote sensing.
● Able to analyze field data collection for mapping benthic habitats, bathymetry, mangroves, and seawater quality using remote sensing.</td></tr>
<tr><td colspan="5">Content:
Interaction of Electromagnetic Energy in Water, Delineation of Optical Shallow Sea and Optical Deep Sea Boundaries, Visual Interpretation of Benthic Habitat and Mangrove, Biophysical Mapping of Mangrove, Benthic Habitat Mapping using Digital Classification, Bathymetry Map Making, Making Sea Surface Temperature Distribution Map using Aqua MODIS Imagery</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 4213 (A/S),
GKP 2206 (P),
GEL 2108 (A)</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and self-report.</td><td colspan="2">Study and examination requirements:
Students must present their mini project in team and complete their self-report. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Goodman, J. A., Purkis, S. J., & Phinn, S. R. (2013). Coral Reef Remote Sensing A Guide for Mapping, Monitoring and Management. (S. R. Phinn, Ed.) Springer.
Green, E. P., Mumby, P. J., Edwards, A. J., & Clark, C. D. (2000). Remote Sensing Handbook for Tropical Coastal Management. Coastal Management Sourcebooks 3. (A. J. Edwards, Ed.) Paris: UNESCO.
Jensen, J. R. (2006). Remote Sensing of the Environment. An Earth Resource Perspective. (K. E. Clarke, Ed.) Prentice Hall.
Kuenzer, C., Bluemel, A., Gebhardt, S., Vo Quoc, T., & Dech, S. (2011). Remote Sensing of Mangrove Ecosystems: A Review. Remote Sensing, 3, 878-928.
Heumann, B. W. (2011). Satellite remote sensing of mangrove forests: recent advances and future opportunities. Progress in Physical Geography, 35(1), 87-108. doi: 10.1177/0309133310385371
Lucas, R., Lule, A. V., Rodríguez, M. T., Kamal, M., Thomas, N., Asbridge, E., & Kuenzer, C. (2017). Spatial Ecology of Mangrove Forests: A Remote Sensing Perspective. Mangrove Ecosystems: A Global Biogeographic Perspective: Structure, Function, and Services (pp. 87-112). Springer .</td></tr>
</table>

Remote Sensing of Atmosphere and Climate Change

<table>
<tr><td colspan="2">Module designation
GKP 4213</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Retnadi Heru Jatmiko, M.Sc.</td><td colspan="2">Lecturer
Dr. Retnadi Heru Jatmiko, M.Sc.
Wirastuti Widyatmanti, S.Si., Ph.D.
Dr.Sc. Sanjiawan Arjasakusuma, M.GIS., M.Sc</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Assignment: 20%
Mid-term: 35%
Final Exam: 45%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to provide examples of the use of remote sensing satellite imagery in the study of the atmosphere and climate change.
● Able to compare remote sensing data types to obtain atmospheric characteristic information at various mapping scales.
● Able to utilize satellite imagery and remote sensing channels suitable for atmospheric and climate change studies.
● Able to determine methods of analysis, synthesis and evaluation, as well as perform image processing and other spatial data for solving atmospheric and climate change problems.</td></tr>
<tr><td colspan="4">Content:
the basic concept of the atmosphere and the approach of remote sensing of the atmosphere in the field of climate change, the scope of the study of remote sensing of the atmosphere, remote sensing for weather monitoring, rainfall mapping, sea surface temperature mapping and various remote sensing applications for the field of atmosphere and climate change</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 2206 (P),
GEL 1201 (A)</td><td>Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, and mini projects presentation.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Bader et al., Images in Weather Forecasting : A Practical Guide for Interpreting Satellite and Radar Imagery.
Campbell, J.B. & Wynne, R.H., 2010; Introduction of Remote Sensing, The Guilford Press, New York.
Conway, 2003; An introduction to satellite image interpretation, University of Maryland
Hughes, S., Chu, E. K., & Mason, S. G. (Eds.). (2017). Climate Change in Cities: Innovations in Multi-Level Governance. Springer.
Lillesand, T., Kiefer, R. W., & Chipman, J. (2014). Remote sensing and image interpretation. John Wiley & Sons.
Oke, T. R. (2002). Boundary layer climates. Routledge.
Oke, T. R., Mills, G., Christen, A., & Voogt, J. A. (2017). Urban climates. Cambridge University Press.</td></tr>
</table>

Geoinformation of Health

<table>
<tr><td colspan="2">Module designation
GKP 4215</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Prima Widayani, S.Si., M.Si.</td><td colspan="2">Lecturer
Dr. Prima Widayani, S.Si., M.Si.
Barandi Sapta Widartono, S.Si., M.Si., M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Mini project: 20%
Mid-term: 40%
Final Exam: 40%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
● Able to explain the relationship between environmental conditions and disease incidence.
● Able to map and spatially analyze disease incidence and health facilities.
● Able to process remote sensing and GIS data to create spatial modeling in the health field.</td></tr>
<tr><td colspan="4">Content:
epidemiology theory, spatial epidemiology, disease, concept of utilizing RS data for health and GIS, health mapping, utilization of GIS and mobile phone software for health applications, diseases associated with geological conditions, RS and GIS application for health facility screening, health profile, and other.</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 3304 (A),
GKP 2206 (A),
GKP 2105 (A)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, and mini projects presentation.</td><td>Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Thomas C Timmreek. Epidemiologi (Suatu Pengantar). Penerbit Buku Kedokteran.
Dirk U. Spatial Analysis in Epidemiologi. Oxford University Press
Albert Donald P, Gesler Wilbert M, Levergood Barbara. 2000. Spatial Analysis, GIS, and Remote Sensing Applications in the Health Sciences. Ann Arbor Press Chelsea. Michigan.
Umar Fahmi, 2005, Manajemen Penyakit Berbasis Wilayah. Penerbit Buku Kompas, Jakarta.
Gerald F Pyle, 1979, Applied Medical Geography, 1979. V.H. Winston & Sons, washington, D.C.
Budiarto, Eko.2003. Pengantar Epidemiologi.Jakarta: Penerbit Buku Kedokteran EGC
Fotheringham S, Rogerson P, 2005. Spatial Analysis and GIS, UK Taylor & Francis Ltd, 4 John St, London WC1N 2ET
Kiefer L, R.W., and Chipman.J. 2004. Remote Sensing and Image Interpretation, 5th edition, John Wiley and Sons, New York.
Pfeiffer Dirk U, Robinson T, Stevenson M, Stevns Kim, Rogers D, Clement A. 2008. Spatial Analysis in Epidemiology. Oxford University Press Inc., New York</td></tr>
</table>

Remote Sensing and GIS for Regional Development

<table>
<tr><td colspan="3">Module designation
GKP 4216</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sigit Heru Murti BS, M.Si.</td><td colspan="3">Lecturer
Dr. Sigit Heru Murti BS, M.Si.
Dr. Iswari Nur Hidayati, M.Sc.
Dr. Pramaditya Wicaksono, M.Sc.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz and Mini Project: 60%
Mid-term: 20%
Final Exam: 20%</td><td colspan="3">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td colspan="2">Student's self-study time:
● Assignments by lecturer: 28 hrs
● Literature study: 28 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to explain the concepts of remote sensing and GIS in regional development.
● Able to identify spatial variables and analyze geospatial data through remote sensing and GIS in regional development.
● Able to work individually or in groups in geospatial analysis using remote sensing and GIS to explain problems related to regional development.
● Able to convey the results of using remote sensing and GIS for regional development.</td></tr>
<tr><td colspan="5">Content:
Basic concepts of regional development, RS concepts for regional development, geographical units in regional development, RS procedures and applications in regional development and site selection, evaluation of RS data capabilities for regional development and site selection.</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 3208 (A),
GKP 3209 (A),
GKP 3210 (A),
GKP 2301 (P)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, quiz and mini projects.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="5">Reading list:
Goodman, J. A., Purkis, S. J., & Phinn, S. R. (2013). Coral Reef Remote Sensing A Guide for Mapping, Monitoring and Management. (S. R. Phinn, Ed.) Springer.
Green, E. P., Mumby, P. J., Edwards, A. J., & Clark, C. D. (2000). Remote Sensing Handbook for Tropical Coastal Management. Coastal Management Sourcebooks 3. (A. J. Edwards, Ed.) Paris: UNESCO.
Jensen, J. R. (2006). Remote Sensing of the Environment. An Earth Resource Perspective. (K. E. Clarke, Ed.) Prentice Hall.</td></tr>
</table>

Geospatial Information Technology

<table>
<tr><td colspan="2">Module designation
GKP 4307</td><td colspan="2">Credits
2 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td>Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Taufik Hery Purwanto, S.Si., M.Si.</td><td colspan="2">Lecturer
Dr. Taufik Hery Purwanto, S.Si., M.Si.
Dr. R. Suharyadi, M.Sc.
Dr. Nur Mohammad Farda, S.Si., M.Cs.
R. Ibnu Rosyadi, S.Si., M.Cs.</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Quiz & Assignments: 10%
Mid-term: 30%
Final Examination: 30%
Mini Project: 30%</td><td colspan="2">Workload Total: 84 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 28 hrs</td><td>Student’s self-study time:
• Assignments by lecturer: 28 hrs
• Literature study: 28 hrs
• Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:
• Able to identify Geospatial Information Technology (TIG) Trends in the era of the Industrial Revolution 4.0 and the era of Destructive Innovation.
• Able to utilize TIG in the field of Geographic Information Science.
• Able to plan projects by applying TIG in the field of Geography.</td></tr>
<tr><td colspan="4">Content:
understanding of TIG terminology, the role and prospects of TIG in the era of globalization, computer applications to support TIG, network and internet technology, data communication in networks, distributed geographic information systems, TIG applications in geography, and TIG projects in geography</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
GKP 1202 (P),
GKP 2105 (P),
GKP 3304 (A)</td><td colspan="2">Type of examination:
The examinations consist of written exams which are implemented as mid-term and final tests, also team based projects and presentation.</td><td>Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the written examinations. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="4">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references</td></tr>
<tr><td colspan="4">Reading list:
Azuma, R.T, 1997, A Survey of Augmented Reality, Presence: Teleoperators and Virtual Environments 6 (4): 355-385.
Longley, P.A, et al., 2005, Geographic Information Systems and Science. 2 ed.,John Wiley & Sons Inc., 111 River Street, Hoboken, NJ 07030, USA.
Milgram, P. and F. Kishino (1994), "A Taxonomy of Mixed Reality Visual Displays", IEICE Transactions on Information Systems E77-D (12): 1321-1329.
Panji, 2014, Empat Megatrend Teknologi IT dan Tantangannya, Sekolah Tinggi Teknologi Terpadu Nurul Fikri.
Reed, S., Kreylos, O., Hsi, S., Kellogg, L., Schladow, G., Yikilmaz, M.B., Segale, H., Silverman, J., Yalowitz, S., and Sato, E., Shaping Watersheds Exhibit: An Interactive, Augmented Reality Sandbox for Advancing Earth Science Education, American Geophysical Union (AGU) Fall Meeting 2014, Abstract no. ED34A-01.
Jyotsana Chuchra, 2017, What is Geospatial Ecosystem? Geospatial World.</td></tr>
</table>

Geospatial Information Technology (practicum)

<table>
<tr><td colspan="3">Module designation
GKP 0307</td><td colspan="2">Credits
1 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
7th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Dr. Sandy Budi Wibowo, S.P., M.Sc.</td><td colspan="3">Lecturer
Dr. Sandy Budi Wibowo, S.P., M.Sc.
Lab’s Assistant</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:
Pretest: 20%
Activity: 10%
Assignment: 10%
Self-report: 30%
Final Assessment: 30%</td><td colspan="3">Workload Total: 48 Hours</td></tr>
<tr><td>Teaching time:
Lecture: 16 hrs</td><td colspan="2">Student’s self-study time:
● Preparation: 2 hrs
● Working on results: 16 hrs
● Compiling self-report and assignment: 16 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:
● Able to utilize information technology in the geospatial field</td></tr>
<tr><td colspan="5">Content:
Computer Hardware, Software, Data Communication, Computer Network and Internet, Web Cartography and Web GIS (Mobile GIS)</td></tr>
<tr><td colspan="5">Teaching methods:
Lectures, hands on practice, discussion</td></tr>
<tr><td>Recommended prerequisites
GKP 4307 (A/S),
GKP 1202 (P),
GKP 2105 (P),
GKP 3304 (A</td><td colspan="2">Type of examination:
The final examinations are conducted by interview and self-report.</td><td colspan="2">Study and examination requirements:
Students must submit their self-report completely and attend the final assessment. To pass this course, students must attend 100% of the exercise and complete all the reports and assignments and get a minimum grade of D</td></tr>
<tr><td colspan="5">Media:
Textbooks, lecture materials, white board, videos, PowerPoint Presentations, Projector, journal and internet references.</td></tr>
<tr><td colspan="5">Reading list:
Tian B. 2017 - GIS technology applications in environmental and earth sciences. CRC Press. 256 p.
Longley et al. 2015. Geographic Information Science and Systems. John Wiley and Sons. Danvers. 460 p.</td></tr>
</table>

Undergraduate Thesis

<table>
<tr><td colspan="2">Module designation
GEO 4002</td><td colspan="2">Credits
6 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
8th</td><td>Relation to curriculum
Compulsory</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Supervisor</td><td colspan="2">Lecturer
Supervisor
Team of examiners</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:</td><td colspan="2">Workload Total: 252 hrs</td></tr>
<tr><td>Teaching time:
Discussion: 84 hrs
Examination: 2 hrs</td><td>Student’s self-study time:
● Literature Study: 42 hrs
● Performing research: 84 hrs
● Writing thesis: 42 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="4">Module objective/intended learning outcomes:</td></tr>
<tr><td colspan="4">Content:</td></tr>
<tr><td colspan="4">Teaching methods:
Lectures, blended learning</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td>Type of examination:
Examinations form is testing session which attended and reviewed by teams of lecturer according to the topics of research.</td><td colspan="2">Study and examination requirements:
Students are prohibited to use textbooks and guidelines during the examinations. To pass this course, students must submit a draft of their thesis, attend the test session, make improvements based on the result from test session and obtain approval from reviewers, and get a minimum grade of C.</td></tr>
<tr><td colspan="4">Media:
Power Point Presentations, Research Proposal and Projector.</td></tr>
<tr><td colspan="4">Reading list:
n/a</td></tr>
</table>

Internship

<table>
<tr><td colspan="2">Module designation
GKP 4003</td><td colspan="3">Credits
3 SKS</td></tr>
<tr><td>Module level
Bachelor Degree</td><td>Semester
8th</td><td colspan="2">Relation to curriculum
Elective</td><td>Language
Indonesian</td></tr>
<tr><td colspan="2">Person responsible for the module
Supervisor</td><td colspan="3">Lecturer
Supervisor</td></tr>
<tr><td colspan="2" rowspan="2">Credit points:</td><td colspan="3">Workload Total: 126 hrs</td></tr>
<tr><td>Teaching time:
Lecture: 0 hrs
Examination: 2 hrs</td><td colspan="2">Student’s self-study time:
● Internship: 76 hrs
● Writing report: 24 hrs
● Preparation for tests and examination: 24 hrs</td></tr>
<tr><td colspan="5">Module objective/intended learning outcomes:</td></tr>
<tr><td colspan="5">Content:</td></tr>
<tr><td colspan="5">Teaching methods:
Practical</td></tr>
<tr><td>Recommended prerequisites
n/a</td><td colspan="2">Type of examination:
Examinations form is test session which attended and reviewed by supervisors according to the place of internship.</td><td colspan="2">Study and examination requirements:
The students are prohibited to use textbooks and guidelines during the examinations. The final score range from 0-100 which were then converted to alphabetical score*.</td></tr>
<tr><td colspan="5">Media:
Power Point Presentations, Internship report and Projector.</td></tr>
<tr><td colspan="5">Reading list:
-</td></tr>
</table>