Appendix A: Module Handbook

ASIIN

UNDERGRADUATE PROGRAM OF GEOLOGICAL ENGINEERING
FACULTY OF EARTH SCIENCE AND TECHNOLOGY
INSTITUT TEKNOLOGI BANDUNG

2017

Geology Compulsory Courses 2nd Year

Module name:	**Tectonophysics**				
Module level, if applicable	2nd year				
Code, if applicable	GL 2012				
Semester(s) in which the module is taught	3rd semester				
Person responsible for the module	Agus Handoyo Harsolumakso, Chalid Idham Abdullah, Benyamin Sapiie				
Lecturer	Agus Handoyo Harsolumakso, Chalid Idham Abdullah, Benyamin Sapiie, Indra Gunawan, Alfend Rudyawan				
Language	Indonesian				
Relation to curriculum	Compulsory				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture and group discussion and presentation	45	2	Lecture and discussion	Lectures: 2 x 14	28
				Preparation and Follow up 4 x 14	56
Total Workload	84 hours				
Credit points	2 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on assignment and practical course report (40%), mid semester exam (25%), and end semester exam (35%))				
Recommended prerequisites	Physical geology, Principle of Stratigraphy, Geomorphology, Petrology				
Related Course	Structural Geology				
Module objectives/intended learning outcomes	Students understand the processes and mechanisms of dynamic earth, and the important concept of plate tectonics as basic in geology and earth science in general.				
Content	Understanding of basic knowledge of geodynamics known as plate tectonics is very important not only their history but also their mechanism and geometry. The general knowledge of earth internal structures, geodynamics, earth quakes distribution, volcanism, and basin distribution including their economic importance and hazard mitigation will be the main target of this course. The lectures give an overview of the following topics: 1. The history of Plate Tectonic 2. Continental Drift 3. Crust, Mantle, Lithosphere, and Asthenosphere 4. Sea Floor and Sediment 5. Volcanism and Plate Tectonic 6. Tectonic and Oceanic Lithosphere 7. Tectonic and Subduction 8. Collision Tectonic and Continental Accretion 9. Continental Spreading				

	10. Intracontinental Sedimentary Basin 11. Tectonic and Geomorphology
Study and examination requirements and forms of examination	Paper test for theory
Media employed	Power Point presentation
Reading list	1. Keary, P., and Vine, F. J., 2009, Global Tectonics; 3rd ed., Willey-Blackwell Scientific Pub, 482p. 2. Strahler, A., (1998), Plate Tectonics, Geo-Books Publishing, 554p. 3. Frisch, W., Meschede, M. and Blakey, R., 2011, Plate Tectonics, Springer, 212p.

Module name:	**Mathematics and Statistics for Geology**				
Module level, if applicable	2nd year				
Code, if applicable	GL-2101				
Semester(s) in which the module is taught	3rd semester				
Person responsible for the module	Dr.Eng. Suryantini, S.T., Dipl Geothermal EnTech., M.Sc. Agus Muhammad Ramdhan S.T., M.T., Ph.D.				
Lecturer	Dr.Eng. Suryantini, S.T., Dipl Geothermal EnTech., M.Sc. Agus Muhammad Ramdhan S.T., M.T., Ph.D.				
Language	Indonesian Language				
Relation to curriculum	Compulsory				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	**Forms of active participation**	Workload	
lecture, lesson, practical,	80-90	2	Lecture, discussion, practical	Lectures: 2 x 14	28
				Preparation and Follow up 4 x 14	56
Total Workload	84 hours				
Credit points	2 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% Final score is average of 50% Maths plus 50% Statistics Math score is evaluated based on assignment (25%) and mid semester exam (75%), Statistics score is evaluated based on class discussion and activity (5%), daily quiz (10%), assignment and (10%) and end semester exam (75%)				
Recommended prerequisites	No pre-requisites course is necessary because this course is basic course				
Related Course	GL2111 GEOLOGI FISIK GL2131 GEOKIMIA UMUM TG211 GEOFISIKA UMUM GL2151 SEDIMENTOLOGI GL 2281 GEOFLUIDA etc.				
Module objectives/intended learning outcomes	**Knowledge and Analytical skills** 1.Able to carry out geological data analysis with univariate and bivariate statistics and simple spatial statistics 2.Able to model and predict simple geological process with common mathematical equations 3. Able to use Excel software and its statistical tool **Skill** 1. Have basic skill to utilize Excel Software properly 2. Have ability to calculate basic statistic and common mathematical equation for geology 3. Have communication and writing skill in explaining the statistics and mathematical modeling results in the form of simple essays. **The character to be developed**				

	1 confidence 2 independent 3 appreciate the difference analysis and opinions according to the data 4 hard worker in calculating and analyzing plenty data No **Competencies outcomes because this is a basic course**
Content	This lecture is designed to improve basic knowledge and skills in applying mathematics and statistics which is commonly used to resolve geological. Mathematics and statistics have generally been studied and used in everyday life, but its use to solve geological problems, will be the main objective in this study. Examples of applications will be given for geological cases such as petrology, stratigraphy, structural geology, geochemistry, geophysics, calculation of earth resources, determining the probability of drilling success and so forth. Some concepts or mathematical functions and statistics that will be discussed, such as regression analysis (best fit) linear and quadratic using the method of least-squares, the analytic solution (Gaussian elimination) and numerical solution (Jacobi method), Marcov Chain, univariate statistics, bivariate statistics, time series analysis and introduction to spatial statistical.
Study and examination requirements and forms of examination	Paper Test
Media employed	Power Point slide, Projector, Black Board, spread sheet software
Reading list	1. ARH Swand and Sandilands, 1995, Introduction to Geological Data Analysis 2. David Waltham, 2000, Mathematics - A Simple Tool for Geologist, John Willey and Sons Inc 3. Davis, J.C.,1970, Statistics and data Analysis in Geology, John Willey and Sons Inc.

Module name:		**Physical Geology**			
Module level, if applicable		2^{nd} year			
Code, if applicable		GL 2111			
Semester(s) in which the module is taught		Every Semester			
Person responsible for the module		Agus Handoyo Harsolumakso, Chalid Idham Abdullah, Benyamin Sapiie			
Lecturer		Agus Handoyo Harsolumakso, Chalid Idham Abdullah, Benyamin Sapiie, Indra Gunawan, Alfend Rudyawan			
Language		Indonesian			
Relation to curriculum		Compulsory Course			
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	45	2	Lecture and discussion	Lectures: (2 x 14)	28
				Preparation and Follow up (4 x 14)	56
Practical	30	1	Practical homework	Practical: 1 x 12	12
				Preparation and Follow up 2 x 12	24
Total Workload		120 hours			
Credit points		3 CU			
Requirements according to the examination regulations		Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on assignment and practical course report (40%), mid semester exam (25%), and end semester exam (35%))			
Recommended prerequisites		Introduction to Earth Science and Technology			
Module objectives/intended learning outcomes		Students are able to know the main geological objects and have the ability to describe and explain the geologic phenomena and processes occurred. In addition it is expected that they can understand basic knowledge which includes the mechanical and chemical process occurred inside and outside earth including those relating to mineral and energy resources			
Content		Physical geology is a science which study earth processes, planetary science and internal structure of the earth, rocks and minerals, surficial processes such erosion and disintegration, sedimentation, transport mechanism such as rivers, beaches as well as eolian. Earth quakes and tectonics processes, volcanism and internal deformation of the earth covers in this course. Study of energy and mineral resources as well as nature hazard include and describe in this course. The lectures give an overview of the following topics: 1. Introduction 2. Rocks and Minerals 3. Igneous Rocks and Intrusive Activity 4. Volcanism 5. Weathering, Erosion, and Soil 6. Sedimentation and Sedimentary Rock 7. Metamorphism and Metamorphic Rock 8. Earthquake and Earth Below Surface Structure		

	9. Deformation and Mountain Formation 10. Mass Movement and Land Slide 11. Hydrology Cycle and Groundwater 12. Environment and Geological Hazard 13. Energy and Geological Resources
Study and examination requirements and forms of examination	Paper test
Media employed	Power Point, Studio Material for practical
Reading list	1. Smith and Pun, 2006, Earthworks, Prentice Hall (Main reference) 2. Tarbuck and Lutgens, 2000, Earth Science, Prentice Hall (Additional reference) 3. Hamblin, 1989, The Earth Dynamic System, McMilan (Additional reference)

<table>
<tr><td colspan="2">Module name:</td><td colspan="5">General Geochemistry</td></tr>
<tr><td colspan="2">Module level, if applicable</td><td colspan="5">2nd year</td></tr>
<tr><td colspan="2">Code, if applicable</td><td colspan="5">GL 2131</td></tr>
<tr><td colspan="2">Semester(s) in which the module is taught</td><td colspan="5">Every Semester</td></tr>
<tr><td colspan="2">Person responsible for the module</td><td colspan="5">Dr. Ir. Bambang Priadi</td></tr>
<tr><td colspan="2">Lecturer</td><td colspan="5">Dr. Ir. Bambang Priadi; Ir. Niniek Rina Herdianita M.Sc.,Ph.D.; and Prof. Dr. Ir. Eddy A. Subroto</td></tr>
<tr><td colspan="2">Language</td><td colspan="5">Indonesian</td></tr>
<tr><td colspan="2">Relation to curriculum</td><td colspan="5">Compulsory Course</td></tr>
<tr><td>Types of teaching and learning</td><td>Class Size</td><td>Attendance time (hours per week per semester)</td><td>Forms of active participation</td><td colspan="3">Workload</td></tr>
<tr><td rowspan="2">Lecture</td><td rowspan="2">80</td><td rowspan="2">2</td><td rowspan="2">Lecture, discussion, and group projects</td><td>Lectures</td><td colspan="2">28</td></tr>
<tr><td>Preparation and Follow up</td><td colspan="2">56</td></tr>
<tr><td colspan="2">Total Workload</td><td colspan="5">84 Hours</td></tr>
<tr><td colspan="2">Credit points</td><td colspan="5">2 CU</td></tr>
<tr><td colspan="2">Requirements according to the examination regulations</td><td colspan="5">Minimum attendance at lectures is 80% (according to ITB regulation). Mid semester exam (40%), and end semester exam (40%), Other incl. presence, homework, quiz (20%).</td></tr>
<tr><td colspan="2">Recommended prerequisites</td><td colspan="5">Physical Geology (Corequisite)</td></tr>
<tr><td colspan="2">Module objectives/intended learning outcomes</td><td colspan="5">Lectures are given with the aim of providing knowledge about the chemical properties, accumulation and distribution of elements in a variety of rocks and geological environment, as well as the roles of the chemical properties of elements, minerals and rocks for geological field.
Students know and have the ability to explain the relevance / role of chemistry and its principles in geological processes and use them to explore further and use it in geological field.</td></tr>
<tr><td colspan="2">Content</td><td colspan="5">Lecture describes the relative and absolute amounts in the occurrence and the abundance of elements and isotopes. It explains the formation and distribution of elements in space, methods of absolute-age dating, the occurrence of elements and isotopes in different chemical stability in tiny crystals to the rocks in various parts of the earth. Lectures will especially examine the chemical equilibria in forming mineral association in igneous, sedimentary and metamorphic rocks, as well as the roles of organics in sedimentations.

The lectures give an overview of the following topics:
1. Introduction
2. Basic Principle of Chemistry
3. Element Abundance in the Universe
4. Isotope and Geochronology
5. Thermodynamic and Crystal Chemistry
6. Magma Geochemistry and Igneous Rocks</td></tr>
</table>

	7. Fluids Geochemistry 8. Sedimentation and Sedimentary Rocks 9. Geochemistry of Metamorphic Rocks 10. Geochemistry of Organic Matter
Study and examination requirements and forms of examination	Paper test for theory
Media employed	Power Point presentation
Reading list	1. Bronlow A.R., 1996, Geochemistry, 2nd Edition, Prentice Hall, New Jersey USA. 2. Dickin A.P., 1995, Radiogenic Isotope Geology, Cambridge Univ Press, UK. 3. Campbell A.N. & Smith N.O., 1951, The Phase Rule and its application, Dover Publ Inc., USA 4. Faure G., 1982, Principles of Isotope Geology, John Wiley & Sons, New York, USA. 5. Gill R., 1989, Chemical Fundamentals of Geology, Chapsman and Hall, London, UK 6. Hunt J.M., 1993, Petroleum Geochemistry and Geology, W.H. Freeman & Company, San Fransisco, USA. 7. Krauskopf KB. & Bird DK, 1995, Introduction to Geochemistry, McGraw-Hill Inc, New York, USA 8. Mason B. & Moore C.B., 1982, Principle of Geochemistry, John Wiley & Sons, New York, USA. 9. Siegel F.R., 1995, Review of Research on Modern Problems in Geochemistry, Earth Sciences, Association for Geochemistry and Cosmochemistry, Unesco. 10. Rose A.W., Hawkes H.E & Webb J.S., 1979, Geochemistry in Mineral Exploration, Academic Press, London, UK 11. Waples D.W., 1985, Geochemistry in Petroleum Exploration, Geological Science Series, International Human Resources Development Corporation, Boston, USA

Module name:	**Crystallography and Mineralogy**				
Module level, if applicable	2nd year				
Code, if applicable	GL2141				
Semester(s) in which the module is taught	3rd semester				
Person responsible for the module	Dr. I Gusti Bagus Eddy Sucipta, ST., MT.				
Lecturer	Dr. I Gusti Bagus Eddy Sucipta, ST., MT. and Dr. Eng. Mirzam Abdurrahman, ST., MT.				
Language	Indonesian				
Relation to curriculum	Compulsory Course				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	80	2	Lecture and discussion	Lectures	28
				Preparation and Follow up : 56 hours	56
Practical	15	1	Report	Practical	12
				Preparation and Follow up	24
Total Workload	120 hours				
Credit points	3 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on course score (60%) and practical report score (40%). Course score consist of mid semester exam (40%), end semester exam (50%), and assignment/quiz (10%)				
Recommended prerequisites	KU1163 Introduction into Geoscience (pre-requisite) and GL2111 Physical Geology (co-requisite)				
Related Course	GL3141 Optical Mineral and Petrography (compulsory) and GL3045 Rock Forming Minerals (elective)				
Module objectives/intended learning outcomes	1. Students having basic knowledge about the relationship of crystals, minerals, and rocks. 2. Students have the ability to identify a group of minerals and their genetic process for use to describe the rocks and economic mineral deposits.				
Content	The lecture examines the crystal axes and its projection to know the crystal system on the ideal minerals, included the symmetry elements of crystal, repetition, growth-twinning pattern, physical and chemical properties for minerals identification. The lecture also explains mineral association to form igneous, pyroclastic, sedimentary and metamorphic rocks, as well as mineral association in economic deposits and gemstones. The lectures give an overview of following topics: 1. Introduction 2. Crystal structure and their regularity 3. Crystal system and symmetry elements 4. Crystal projection and crystal classes 5. Repetition pattern in crystallography 6. Crystal chemistry 7. Mineral chemistry				

	8. Physical properties of minerals and their identification 9. Mineral classification 10. Mineral association in igneous and pyroclastic rocks 11. Mineral association in sedimentary rocks 12. Mineral association in metamorphic rocks 13. Alteration mineral and gemstones
Study and examination requirements and forms of examination	Paper Test and Practical Test
Media employed	White board, computer, projector, wood crystals model, minerals or rocks specimens
Reading list	1. Klein, C. and Hulburt, C. S., 1993, Manual of Mineralogy, John Willey and Sons, Inc., New York USA, 681p. 2. Mottana, A., Crespi, R., and Liborio, G., 1978, Guide to rocks and minerals, Simon & Schuster, Inc., 607p. 3. Read, P. G., 2005, Gemology, Elsevier Ltd., London, 324p. 4. Chang, R., 1998, Chemistry, Sixth editions, WCB McGraw Hill, New York USA, 993p 5. Klein, C., 1989, Minerals and Rocks: Exercises in Crystallography, Mineralogy and Hand-Specimen Petrology, John Willey and Sons, Inc., New York USA, 402p. 6. Philips, W. J. and Philips, N., 1980, An Introduction to Mineralogy for Geologists, John Willey and Sons, Inc., New York USA, 352p.

Module name:	**Sedimentology**				
Module level, if applicable	2nd year				
Code, if applicable	GL 2151				
Semester(s) in which the module is taught	Every Semester				
Person responsible for the module	Dr. Ir. Dardji Noeradi				
Lecturer	Dr. Ir. Dardji Noeradi and Dr. Dwiharso Nugroho, S.T., M.T.				
Language	Indonesian				
Relation to curriculum	Compulsory Course and Minor Course				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	80	2	Lecture and discussion	Lectures: (2 x 14)	28
				Preparation and Follow up (4 x 14)	56
Practical	20	1	Practical homework	Practical: 1 x 12	12
				Preparation and Follow up 2 x 12	24
Total Workload	120 hours				
Credit points	3 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on assignment and practical course report (20%), mid semester exam (40%), and end semester exam (40%).				
Recommended prerequisites	1. Crystallography and Mineralogy (Prerequisite) 2. Petrology (Prerequisite)				
Module objectives/intended learning outcomes	By following this course, students are expected to understand concepts, theories and basic laws that apply in the formation of sedimentary rock particles and in the transportation/sedimentation of the particles. Students are able to understand the process of sedimentation either mechanical, chemical, or organic. In addition, students are also expected to be able to master the methods and procedures for laboratory and/or field analysis to produce data and data synthesis that can be used to understand the process of sedimentation of sedimentary rocks which then can be a clue in assessing the geometry, distribution and sedimentary rocks depositional environment. After following this course the student is expected to understand: 1. Sedimentary texture and structure as an indicator of sedimentary process 2. Process that occurs in carbonate rocks formation 3. How to analyze sedimentary rock environmental deposition based on its character				
Content	The course explaining about sedimentary particles how it formed, transported and deposited in term of mechanical, chemical and biological processes. Explaining about where and how sedimentary				

	rocks were deposited and its characteristic. To understand all about sedimentary rocks the course started with sedimentary texture analysis comprising of grain size, grain shape and grain packing. Based on sedimentary texture the sedimentary processes are elaborated; starting with mechanical process of traction and gravity mass flow, in this topic sedimentary structure and its relation to sedimentary processes are discussed. Continue with carbonate sedimentation in which biological process is predominant beside mechanical and chemical, following by the chemical process of evaporitic sediments The course continue with sedimentary rocks classification and depositional analysis. Depositional analysis comprise of continental, transitional, shallow marine and deep marine. The course ended with the economic potential of sedimentary rocks. The lectures give an overview of the following topics: 1. Introduction 2. Sedimentary Rock Forming Particle 3. Sedimentary Process 4. Sedimentary Rocks Classification 5. Depositional Environment and Sedimentology Characteristics and its Stratigraphic Pattern 6. Methods of Environmental Deposition Analysis 7. Sedimentology Role and Sedimentary Rock as Geological Resources
Study and examination requirements and forms of examination	Paper Test and Practical Test
Media employed	Laboratory Activity, Power Point Slide, Excursion is tentative
Reading list	1. Friedman, GM., Sanders, JE, 1978, Principles of Sedimentology, John Wiley & Sons Inc. 2. Collinson, JD., Thompson, DB. 1982, Sedimentary Structures 2nd Ed., London Unwin Hyman, 207 pages. 3. Mc Lane, M., 1995, Sedimentology, Oxford University Press Inc., 423 pages. 4. Pettijohn, FJ., Potter, PE., 1964, Atlas and Glossary of Primary Sedimentary Structure, Springer-Verlag, Berlin, 370 pages.

Module name:	**Paleontology**				
Module level, if applicable	2nd year				
Code, if applicable	GL 2171				
Semester(s) in which the module is taught	1st semester				
Person responsible for the module	Dr. Ir. Yan Rizal R., Dipl. Geol. and Dr. Aswan ST., MT.				
Lecturer	Prof. Dr. Ir. Jahdi Zaim, Dr. Ir. Yan Rizal R., Dipl. Geol., Dr. Aswan ST., MT., Mika Rizki Puspaningrum, S.Si., MT.				
Language	Indonesian				
Relation to curriculum	compulsory course				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	90 (2 x 45)	2	quiz, discussion, assignment	Lectures: 28 hours (2 hours x 14 weeks)	28
				Preparation and Follow up: 56 hours (4 hours x 14 weeks)	56
practical, presentation	90 (8 x 11/12)	1	quiz, report, presentation	Practical: 12 hours (1 hours x 12 weeks)	12
				Preparation and Follow up 24 hours (2 hours x 12 weeks)	24
Total Workload	120 hours/semester				
Credit points	3 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on assignment and practical course report (30%), mid semester exam (35%), and end semester exam (35%)				
Recommended prerequisites	-				
Related Course	1. Micropaleontology (prohibition) 2. Sedimentology (prohibition) 3. Principle of Stratigraphy (prohibition) 4. Historical Geology (prohibition) 5. Tectonophysics (prohibition)				
Module objectives/intended learning outcomes	Students be able to understand the basic and application of evolution and paleontology and its role to stratigraphy, sedimentology, and its application to geology in general.				
Content	The lecture is about basic principles of paleontology, fossils and fossilization process, the sense of space and time in evolution and paleontology, paleontology/fossil role in geology. Quantitative and qualitative methods in paleontology, and also fossil meaning in the geologic time scale formulation will be discussed in this module. The systematic of macrofossils will also be elaborated and introduced. The module also explains the methods used for fossil identification, particularly discussed the key taxa for each of geological periods recorded in Indonesia.				

	The lectures give an overview of the following topics: 1. Introduction 2. Fossilization Process 3. Rocks and Fossils 4. Bathymetry Zone 5. Evolution 6. Taxonomy 7. Methods in Taxonomy 8. Arthropod and Coelenterate 9. Bryozoan and Porifera 10. Brachiopods 11. Mollusk 12. Ichnofossil and Vertebrata 13. Biostratigraphy and Depositional Environment
Study and examination requirements and forms of examination	Paper Test and individual presentation
Media employed	Presentation slides, movie
Reading list	1. Basic Paleontology, Benton & Harper ; Longman, 1997 2. Invertebrate Paleontology, Clarkson; Charman & Hall, 1993 3. The Practical Paleontologist, Parker & Bernor, Fireside Book, 1990 4. Paleontology, Romer, The Univ. Chicago Press, 1966 5. Bringing Fossils to Life, Prothero, McGraw Hill, 1998 6. Invertebrate Paleontology and Evolution, 2nd ed., Clarkson; Allen & Unwin, 1986. 7. Introduction to Paleobiology and the fossil record, Benton and Harper; Wiley-Blackwell, 2009

Module name:		**Structural Geology**			
Module level, if applicable		2nd year			
Code, if applicable		GL 2212			
Semester(s) in which the module is taught		2nd Semester			
Person responsible for the module		Dr. Ir. Agus Handoyo Harsolumakso; Dr. Ir. Chalid Idham Abdullah; Ir. Benyamin Sapiie Ph.D.			
Lecturer		Dr. Ir. Agus Handoyo Harsolumakso, Dr. Ir. Chalid Idham Abdullah; Ir. Benyamin Sapiie Ph.D.; Indra Gunawan S.T., M.Sc. Ph.D; Alfend Rudyawan S.T., M.T., Ph.D.; Dr. Meli Hadiana, S.T., M.T.			
Language		Indonesian			
Relation to curriculum		Compulsory			
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	45	2	Lecture and discussion	Lectures: 2 x 14	28
				Preparation and Follow up 4 x 14	56
Practical	45	1	Practical homework	Practical: 1 x 12	12
				Preparation and Follow up 2 x 12	24
Total Workload		120 hours			
Credit points		3 CU			
Requirements according to the examination regulations		Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on assignment and practical course report (40%), mid semester exam (25%), and end semester exam (35%))			
Recommended prerequisites		Physical geology, Principle of Stratigraphy, Geomorphology, Petrology			
Related Course		Tectonophysics			
Module objectives/intended learning outcomes		Students are able to recognize elements of geological structures, perform a geometric description, kinematic and dynamic analysis and can explain the process occurred. Students are also expected to carry out the synthesis in relation to tectonic processes associated with the formation of these structures.			
Content		Structural geology is a study of deformed rocks including shape, geometry and architecture of the crust as well as their deformation mechanism. Structural geology includes understanding tectonic deformation such as force, stress and strain. Identifying, mapping and analyzing various different structures such as fractures, folds, faults, foliation, cleavages and lineation and their relationship among them in the context of plate tectonic. Applying structural geology techniques in analyzing geological natural disaster in active tectonic regions including earthquakes and landslides, hydrocarbon migration and trap, economic minerals and engineering geology. The lectures give an overview of the following topics: 1. Introduction into structural geology 2. Kinematic Analysis 3. Dynamic Analysis			

	4. Fracture Mechanic 5. Structure Element and Deformation Mechanism 6. Fractures, Joints, and Fault 7. Fold 8. Fault and Fold Interaction 9. Foliation, Cleavage, and Lineage 10. Shear Zones and Progressive Deformation 11. Active Tectonics 12. Structural Geology Application in hydrocarbon and mineral prospects, and engineering geology.
Study and examination requirements and forms of examination	Paper test for theory and practical, field trips will be organised
Media employed	Power Point, Studio Material for practical
Reading list	1. Davis, G. H., Reynolds, S. J., and Kluth, C. F., 2012, Structural Geology of Rock and Regions: 3rd edition, John and Wiley and Sons, Inc., 835 p. 2. Fossen, H., 2010, Structural Geology, Cambrige University Press, 463 p. 3. Twiss, R. J. and Moore, E. M., 1992, Structural Geology: W. H. Freeman and Company, 532 p. 4. Marshak and Mitra, (1988), Basic Methods of Structural Geology, Prentice-Hall, 441.

Module name:	**Petrology**				
Module level, if applicable	2nd year				
Code, if applicable	GL2242				
Semester(s) in which the module is taught	4th semester				
Person responsible for the module	Prof. Dr. Ir. Emmy Suparka				
Lecturer	Prof. Dr. Ir. Emmy Suparka; Dr. I Gusti Bagus Eddy Sucipta; Ir. Nurcahyo Indro Basuki, Ph.D.				
Language	Indonesian				
Relation to curriculum	Compulsory Course				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	80	2	Lecture and discussion	Lectures	28
				Preparation and Follow up : 56 hours	56
Practicals	15	1	Report	Practical	12
				Preparation and Follow up	24
Total Workload	120 hours/semester				
Credit points	3 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on practical course report (30%), mid semester exam (30%), and end semester exam (30%), and assignment/quiz (10%)				
Recommended prerequisites	GL2141 Crystallography and Mineralogy (pre-requisites)				
Related Course	GL3141 Optical Mineral and Petrography (compulsory) and GL3044 Petrogenesis (elective)				
Module objectives/intended learning outcomes	1. Students having basic knowledge about the rocks as a part of lithosphere and understanding about rocks type, mineralogy, texture, structure, and their genesis in general. 2. Students have the ability to identify and describe the rocks in the megascopic scale included their classification and relationship in the fields				
Content	The lecture examines the igneous rocks, pyroclastic rocks, sedimentary rocks, and metamorphic rocks in the megascopic scale, included their mineralogy, texture, and structure. The lecture also explains how to identify the rocks and how to understand the rock formation, included their classification and relationship in the fields The lectures give an overview of following topics: 1. Introduction 2. Igneous rocks 3. Pyroclastic rocks 4. Sedimentary rocks (non carbonate rocks) 5. Sedimentary rocks (carbonate rocks) 6. Metamorphic rocks				
Study and examination requirements and forms of examination	Paper Test and Practical Test				
Media employed	White board, computer, projector, minerals or rocks specimens				

Reading list	1. Ehlers,E., Harvey Blatt , 1982. Petrology. Igneous, Sedimentary, and Metamorphic, Freeman, 732p. 2. Fischer, R.V. and Schmincke, H.U., 1984, Pyroclastic Rocks, Springer-Verlag, San Francisco, 472p. 3. Tucker, Maurice E., 2001. Sedimentary Petrology, An Introduction to the Origin of Sedimentary Rocks. Blackwell Science Ltd., 286p.

Module name:		**Principle of Stratigraphy**			
Module level, if applicable		2nd year			
Code, if applicable		GL 2252			
Semester(s) in which the module is taught		2nd Semester			
Person responsible for the module		Dr. Djuhaeni			
Lecturer		Dr. Djuhaeni			
Language		Indonesian			
Relation to curriculum		Compulsory Course			
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture	80	2	Lecture, discussion, and group projects	Lectures	28
				Preparation and Follow up	56
Total Workload		84 hours			
Credit points		2 CU			
Requirements according to the examination regulations		Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based exams			
Recommended prerequisites		Sedimentology (Prerequisite)			
Module objectives/intended learning outcomes		Students are able to understand the basic principles of stratigraphy.			
Content		In geology, it is required an understanding of sedimentary rocks and their relation in space and time. The basic concept of stratigraphy, stratigraphic process and rock layers reconstruction process is the main topic of this course. Furthermore, the division into stratigraphic units: lithostratigraphy, biostratigraphy and chronostratigraphy will be discussed in the Standard of Indonesian Stratigraphy. Understanding the concept of time and space correlations will be the main objective in the course Principles of Stratigraphy. Geological history and the economic value will be discussed by a cross section-correlation. The lectures give an overview of the following topics: 1. Introduction into Principles of Stratigraphy 2. Basic Law in Stratigraphy 3. Process in Stratigraphy 4. Concept of Facies 5. Concept of Unconformity 6. Stratigraphic Unit 7. Correlation			
Study and examination requirements and forms of examination		Paper Test			
Media employed		Presentation slides			

Reading list	1. Dunbar,C.O and Rodgers,J (157), Principal of Stratigraphy 2. Schoch, R.M, (1989), Stratigraphy: Principal and Methods 3. Martodjojo, S dan Djuhaeni, (1996), Sandi Stratigrafi Indonesia

Module name:		**Micropaleontology**			
Module level, if applicable		2nd year			
Code, if applicable		GL-2261			
Semester(s) in which the module is taught		4th Semester			
Person responsible for the module		Dr. Rubiyanto Kapid			
Lecturer		Dr. Rubiyanto Kapid			
Language		Indonesian			
Relation to curriculum		Compulsory			
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
Lecture, Presentation	80	2	Lecture and discussion	Lectures: 2(hrs) x 14 (sessions)	28
				Preparation and Follow up 4(hrs) x 14 (sessions)	56
Practical	15	1	Report, Observation	Practical: 1(hr) x 12 (practicals)	12
				Preparation and Follow up 2(hrs) x 12 (practicals)	24
Total Workload		120 hours			
Credit points		3 CU			
Requirements according to the examination regulations		Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on assignment and practical course report (30%), mid semester exam (30%), and end semester exam (40%)			
Recommended prerequisites		Paleontology			
Related Course		Principe Stratigraphy; Micropaleontology & Biostratigraphy; Biostratigraphy Quantitative; Nannoplankton; Palynology.			
Module objectives/intended learning outcomes		The students can understand the type of microfossils, how to evaluate microfossils data, the identification of microfossils, biostratigraphy analysis and the application in industry and geology research.			
Content		Micropaleontology gives the knowledge about microfossil and the application of microfossils in Industry and research. This lecture provides how to identify of microfossil, how to take the samples, the relationship with sedimentology and stratigraphy, biostratigraphy analysis and the application in Industry and research. Some aspects that will be discussed in this course: 1. Fossil and sedimentology analysis 2. Biostratigraphy 3. Small foraminifera (geology aspect and identification) 4. Large foraminifera (geology aspect and identification) 5. Nannoplankton (introduction) 6. Palynology (introduction) 7. Radiolarian (introduction) 8. The application of microfossils in industry and research			
Study and examination		Paper Test and Group Presentation			

requirements and forms of examination	
Media employed	Presentation of lecture slides, watching video, and practice at the laboratory using microscope
Reading list	1. BouDagher-Fadel, M.K., 2008: Evolution and Geological Significance of Larger Benthic Foraminifera 2. Bolli, H.M., J.B. Saunders, and K., Perch - Nielsen, 1985: Plankton Stratigraphy 3. Aubry, M.P., 1984: Handbook of Cenozoic Calcareous Nannoplankton 4. Blow, W.H., 1969: The Cenozoic Globigerinida. 5. Glaessner, M.F., 1945 : Principles of Micropaleontology

Module name:	**Geofluids**				
Module level, if applicable	2nd year				
Code, if applicable	GL2281				
Semester(s) in which the module is taught	4th Semester				
Person responsible for the module	Prof. Ir .Lambok M. Hutasoit, M.Sc., Ph.D.				
Lecturer	Agus M. Ramdhan, S.T., M.T., Ph.D. and Irwan Iskandar, S.T.,M.T., Ph.D.				
Language	Indonesian				
Relation to curriculum	Compulsory Course				
Types of teaching and learning	Class Size	Attendance time (hours per week per semester)	Forms of active participation	Workload	
lecture and homework	80	2	Lecture and discussion	Lectures: 2 hours x 14 times	28
				Preparation and Follow up: 4 hours x 14 times	56
Total Workload	84 hours				
Credit points	2 CU				
Requirements according to the examination regulations	Minimum attendance at lectures is 80% (according to ITB regulation). Final score is evaluated based on weekly assignment and presence (20%), mid semester exam (40%), and end semester exam (40%)				
Recommended prerequisites	1. Math (Prerequisite) 2. Physic (Prerequisite)				
Related Course	Physical Geology				
Module objectives/intended learning outcomes	Students be able to understand the science of fluid mechanics to complete the basic science of fluid and basic science of earth that has been studied in First Year Preparation Program. This science is expected to help students understand the role of fluids in geological processes on the surface and underground.				
Content	Fluids have important roles to geological processes, at the surface and sub-surface. This course covers basic principles of fluid mechanics and its role to various geological processes. Some aspects that will be discussed in this course: 1. The genetic and evolution of fluids 2. Physical, chemical, and isotopically properties of geo-fluids 3. Tectonic, stress, pore pressure 4. Fracturing in fluid system 5. Fluid flow and heat transport in geothermal system 6. Fluids in diagenesis and mineralization 7. Geofluids in sedimentary basin 8. Interaction and influence of magmatic and metamorphic fluids				
Study and examination requirements and forms of examination	Midterm, final term, and homework				
Media employed	Slide projector				

Reading list	• Chapman, R.E., 1981, Geology and Water: An Introduction to Fluid Mechanics for Geologists. • Drever, J.I., 1988, The Geochemistry of Natural Waters. Ingebritsen, S., Sanford, W., and Neuzil, C., 2006, Groundwater in Geologic Processes.
Additional Information	This course is introduction into fluids mechanic for geology