

**Graduate school of fisheries and marine science,  
Sam Ratulangi University**

Subject title	Bioecology of Tropical Waters	Semester 1 Credit 3
Key words	Tropical waters, geographical distribution in tropical waters, species interaction, typical tropical ecosystem: mangrove, coral reefs, seagrass, sea weed estuary, hydrology of Pacific and Indian Ocean.	
Professor Lecturer	Prof. Fontje KALIGIS, Dr. MedyOMPI	
Contact Office		
Contact Hours	1300-1600	
Target	To let the student understand: (1) Characteristic of Tropical waters, (2) Geographical distribution in tropical waters, (3) Species interaction(4) typical tropical ecosystem, mangrove, coralreefs, seagrass, and estuary, (5) Hydrology of Pacific and Indian Ocean.	
Course description	The characteristic of tropical watersbioecology, including species interaction, typical tropical ecosystem will be explained by the professor. Students are requested to search literatures/journals relevant to the explained model and report it.	
Schedule	<ol style="list-style-type: none"> <li>1. Introduction to the science of ecology and biology of tropical waters</li> <li>2. Geographical distribution</li> <li>3. The problem of abundance in tropical waters</li> <li>4. Species Interaction</li> <li>5. Conservation Biology</li> <li>6. Distribution and abundance at community level</li> <li>7. Ecosystem metabolism</li> <li>8. Bioecology of mangrove</li> <li>9. Bioecology of coral reefs</li> <li>10. Bioecology of seegrass</li> <li>11. Bioecology of seaweed</li> <li>12. Bioecology of estuary</li> <li>13. Bioecology of intertidal area of tropical waters</li> <li>14. Hydrology of the Pacific ocean</li> <li>15. Hydrology of the Indian ocean</li> </ol>	
Important items:	Some typical tropical ecosystem will be closely looked on the surrounding local area in Manado bay. Comparison to the temperate waters is important to take into consideration.	
Self-studies and other advices	Homework needs searching and summarizing journal papers and preparing reports on all items of 15 lectures.	
Textbooks	Handout is prepared by the lecturer and students have to find relevant journal papers.	
Requisites to take subject:	unconditional and no prerequisite	
Assessment method	Continues assessment on the basis of reporting and participation the discussion	
Evaluation criteria	Pass if satisfactory reporting and participating into discussions and not less than 60% of classes	
Relevant matters	Lecture will be in English.	

**Graduate school of fisheries and marine science,  
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Subject title	Aquatic and Fisheries Resources Management	Semester 1 Credit 3
Key words	Fisheries resources, fisheries management, responsible fisheries, stock assessment, input control, output control.	
Professor	Prof. Rene Charles Kepel Dr. Lawrence J. L. Lumingas	
Contact Office		
Contact Hours		
Objective	Students can describe kinds of fisheries resources, fishing gears and methods, world fisheries development, problems and the importance of fisheries management, and principles, objectives and strategies of fisheries management, fisheries control and ecosystem-based fisheries resources management.	
Course description	This course describes how to maximally exploit the fisheries resources in biological, economic, and social aspects in sustainable and responsible way. The materials include fisheries resources, global fisheries production development of Indonesia, importance of fisheries resources management, fisheries management principles, problems in fisheries management, role of stock assessment in fisheries management, fisheries management strategy and objective, fisheries regulations (input and output control).	
Schedule	<ol style="list-style-type: none"> <li>1. Course contract</li> <li>2. Introduction</li> <li>3. Fisheries resources</li> <li>4. Fishing gears and methods</li> <li>5. Global capture fisheries development</li> <li>6. Indonesian capture fisheries development</li> <li>7. Importance of fisheries management</li> <li>8. Mid-term exam</li> <li>9. Role of stock assessment in fisheries management</li> <li>10. Problems in fisheries management</li> <li>11. Fisheries management principles</li> <li>12. Objectives and strategies of fisheries management</li> <li>13. Input control</li> <li>14. Output control</li> <li>15. Ecosystem-based fisheries resources management</li> <li>16. Final exam</li> </ol>	
Materials & references	<p>Charles, A. T. 2001. Sustainable Fishery Systems. Blackwell Science Ltd., Oxford.</p> <p>Gulland, J. A. 1974. The Management of Marine Fisheries. Scientifica Ltd., Bristol.</p> <p>King, M. 1995. Fisheries Biology, Assessment and Management. Fishing News Books, Oxford.</p> <p>McClanahan, T. R. dan J. C. Castilla. 2007. Fisheries Management: progress towards sustainability. Blackwell Publishing Ltd, Oxford.</p> <p>Willman, R. et al. 2009. The sunken billions, the economic justification for fisheries reform. The World Bank &amp; FAO.</p>	
Requisites to take subject	none	
Assessment method	presence 10 %, group or individual assignment 10 %, presentations 10 %, mid-term exam 35 %, final exam 35 %.	
Evaluation criteria	0 to <30 = E; 30 to <60 = D; 60 to <70 = C; 70 to <80 = B; ≥ 80 = A	

Language

Bahasa Indonesia and English

**Graduate school of fisheries and marine science,  
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Subject title	Fisheries Vessel Practice	Semester 1 Credit 1
Key words	Fish Behavior, Rumpon, Fish aggregating devices (FAD), plankton net, video sounder, data analysis	
Professor Lecturer	Dr. Johnny Budiman Prof. K.W.A. Masengi Dr. Alfret Luasunaung	
Contact Office	Fishing Technology Laboratory	
Contact Hours	During on-board training	
Target	To understand measuring and operating principles of various devices for oceanographic and FADs observations To collect data and samples in rumpon (FADs) To observation and data analysis for fish school under the "rumpon" (FADs) To practice fishing using tuna hand line	
Course description	This course focused on rumpon (FADs) observation and fishing practice using tuna hand line	
Schedule	<ol style="list-style-type: none"><li>1. Introduction (before going on-board)Intro</li><li>2. introduction to rumpon (FADs) and fish behaviour</li><li>3. Current description of cruise navigation</li><li>4. oceanographic data measurements</li><li>5. Sample collection using plankton net</li><li>6. Observations on fish schooling patterns using video sounder</li><li>7. Data Analysis on fish distribution pattern and graph</li><li>8. Data analysis on fish catch using tuna hand line</li></ol>	
Important items:		
Self-studies and other devices	Students should search and know various devices and equipment related topics before going on-board.	
Textbooks	Handout is prepared by the lecturer and team	
Requisites' to take subject:	unconditional and no prerequisite	
Assessment method	Assessment is done on the basis of reporting and participation the discussion.	
Evaluation criteria	Pass if report and participation in the discussions and not less than 60% of classes	
Relevant matters	Lecture will be in English.	

**Graduate school of fisheries and marine science,  
Sam Ratulangi University**

Subject title	Technology of Capture Fisheries	Semester 1 Credit 3
Key words	Fishing technology, responsible fishing, fishing gear	
Professor Lecturer	Dr. Johnny Budiman Dr. Vivanda Modaso Dr. Alfret Luasunaung	
Contact Office	Fishing Technology Laboratory	
Contact Hours	1300-1600	
Target	To make students understand how to analyze the process of fishing operations and the use of fishing methods.	
Course description	This course discusses the technological of capture fisheries focused on greater and more appropriate fishing methods to reduce negative environmental impacts.	
Schedule	<ol style="list-style-type: none"><li>1. Introduction</li><li>2. Indonesian fishery management area and its characteristics</li><li>3. Current status of capture fisheries in Indonesia</li><li>4. Fish behavior (advanced)</li><li>5. Electronic instruments and fish detection equipment</li><li>6. Fish handling mechanisms</li><li>7. Fishing gear selectivity, discard, by catch and ghost fishing</li><li>8. Fishing methods</li></ol>	
Self-studies and other devices	Students should search related topics through internet and solve some problems prepared by the lecturer.	
Textbooks	Handout is prepared by the lecturer and students have to find relevant journal papers.	
Requisites to take subj	unconditional and no prerequisite	
Assessment method	Assessment on the basis of report and participation in the discussion	
Evaluation criteria	Pass if satisfactory reporting and participating into discussions and not less than 60% of classes	
Relevant matters	Lecture will be in English.	

**Graduate school of fisheries and marine science,  
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Subject title	Fishing Gear Technology	Semester 1 Credit 3
Key words	Fishing gear, Fishing technology, Friendly fishing gear	
Professor Lecturer	Dr. Johnny Budiman Dr. Frangky E. Kaparang Dr. Vivanda Modaso	
Contact Office	Fishing Technology Laboratory	
Contact Hours	1300-1600	
Target	To make students understand how to analyze and design the environmentally friendly fishing gear in Pacific waters.	
Course description	This course discusses the technological trends of fishing gears in relation to responsible fisheries and analyzes the technical and environmental aspects (ecosystems) of the fishing gear.	
Schedule	<ol style="list-style-type: none"><li>1. Introduction</li><li>2. Ecosystems Approach for Fishing Technology</li><li>3. Fishing gear materials</li><li>4. Purse Seine</li><li>5. Trolling, hand line and Long Line</li><li>6. Trawl</li><li>7. Set Net</li><li>8. Trap</li><li>9. Ornamental fish fishing gear technology</li></ol>	
Important items:		
Self-studies and other devices	Students should search related topics through internet and solve some problems prepared by the lecturer.	
Textbooks	Handout is prepared by the lecturer and students have to find relevant journal papers.	
Requisites' to take subject:	unconditional and no prerequisite	
Assessment method	Assessment on the basis of reporting and participation the discussion	
Evaluation criteria	Pass if report and participation in the discussions are satisfactory and not less than 60% of classes	
Relevant matters	Lecture will be in English.	

**Graduate school of fisheries and marine science,  
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Subject title	Marine Food Resources	Semester 1 Credit 3
Key words	Marine resources, Marine Food Science, Source of protein , minerals, carbohydrate. Food safety, food poisoning	
Professor	Professor Siegfried Berhimpon Professor I Ketut Suwetja Professor Frans Ijong	
Contact office	Faculty of Fishery and Marine Science, Sam Ratulangi University. Manado, Indonesia. <a href="mailto:berhimpons@yahoo.com">berhimpons@yahoo.com</a> Mobile phone: +62811430567	
Contact hours	Any time by appointment	
Target	To let students to obtain basic knowledge for 1) Marine food resources: sources of protein, carbohydrate, fat, minerals, vitamin ,2) Food crisis, New food resources from sea, 3) Characteristics of seafood, advantages and disadvantages, 4) introduction to Marine food handling and processing, 5) Food and marine pollution, 6) Marine food poisoning, 7) Marine Food Safety.	
Course description	This lecture is conducted by three professors,. Each major section is scheduled for one to three days and an additional section is set in the last day to check student's understandings.	
Schedule	<ol style="list-style-type: none"> <li>1. Introduction to Marine food resources: sources of protein, carbohydrate, fat, minerals, vitamin, Presence depend on cultural, socio economics, ecology (S. Berhimpon)</li> <li>2. World food crisis, New food resources from sea, potency and technology (S. Berhimpon)</li> <li>3. Characteristics of seafood and the need for special handling; Advantages and disadvantages ( I Ketut Suwetja)</li> <li>4. Introduction to Marine Food Processing. (S. Berhimpon)</li> <li>5. Mid Test to check students understanding (Tim)</li> <li>7. Seafood and Marine pollution: chemical and microorganism , Food safety (F. Ijong)</li> <li>8. Marine food Poisoning (S. Berhimpon)</li> <li>9. Marine Exotic Food (S. Berhimpon).</li> </ol>	
Important items	To introduce basic understanding of marine food resource and characteristics, and can develop a knowledge to find new food sources.	
Self-studies and other advices	Homework needs reading documents distributed before a class, and writing a paper in a special topic.	
Textbooks	Prepared by the professor each time	
Requisites to take subject:	Unconditional and no prerequisite	
Assessment method:	Multiple choice, essay test, papers	
Evaluation criteria:	Follow the Unsrat criteria	
Relevant matters:	Explanations in English entirely	

**Graduate school of fisheries and marine science,  
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Subject title	Marine Pollution and the Health of Marine Life	Semester 2 Credit 3
Key words	Tropical waters, geographical distribution in tropical waters, species interaction, typical tropical ecosystem: mangrove, coralreefs, seagrass, sea weed estuary, hydrology of Pacific and Indian Ocean.	
Professor	Ir. Suzanne Lydia Undap, M.Si.,Ph.D and teams.	
Contact Office	Afterclass	
Target	The students will be able to understand the problem of marine pollution environmental threats and the harmful effects of marine pollution to marine life, especially on tropical species.	
Course description	This course explores the intersection of marine pollution environmental and health concerns in marine life with tropical species as the focus. Emphasis is placed on marine pollution in context: causes and effects, regulations and enforcement. The lecture describes the major issues and challenges in health of marine life. Students will also attain a basic understanding of the interdependent between marine pollutants and the health of marine life. Finally, students will have group discussions and interpreting field observations.	
Schedule	<ol style="list-style-type: none"> <li>1. Introduction to the Course (What is the marine pollution environment; sources, types and their impacts; What is the health of marine life, the relationship of marine pollution and health of marine life; regulations.)</li> <li>2. Pollution problems of groundwater resources (Common transport processes of pollutants to the marine life).</li> <li>3. Pollutants (sewage, pesticides, radioactive wastes, biomedical wastes. Oils, metals)</li> <li>4. Marine oil pollution (What is oil, fate of spilled oil, treatment of oil at marine, dispersant, marine life health risks and damage, case studies.</li> <li>5. Heavy metals pollution (Characteristics, input and uptake, marine life health risks and damage, case studies)</li> <li>6. Harmful algal bloom and their managements (Causative marine organisms, impact and relation with eutrophication, case studies)</li> <li>7. Methods of pollution surveys.</li> <li>8. Field observations, student presentation and discussions</li> </ol>	
Important items:	Some typical tropical ecosystem will be closely looked on the surrounding local area in Manado bay. Comparison to the temperate waters is important to take into consideration.	
Textbooks	Prepared by lecturers using recent references (such as (textbooks: Marine Pollution by Clark, R.B, 2001; Marine Pollution bulletin etc.)	
Requisites to take subject:	unconditional and no prerequisite	
Assessment method	Continues assessment on the basis of reporting and participation the discussion	
Evaluation criteria	Pass if satisfactory reporting and participating into discussions and not less than 60% of classes	
Relevant matters	Lecture will be in English.	

**Graduate school of fisheries and marine science,  
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Subject title	Tropical Marine Biodiversity	Semester 2 Credit 3
Key words	Marine, Biodiversity, Conservation,	
Professor	Professor Grevo S. Gerung	
Contact Office	Department of Marine Sciece	
Contact Hours	After Class	
Target	to lead students having more perspectives on marine biodiversity to explore howreach the biodiversity in tropical waters especially in coral triangle region	
Course description	The subject gives principles of research methodology for exploration and exploitation of the molecular potentials of marine organisms and remediation of contaminated ecosystem. Gene expression for some important target proteins is emphasized, and some methods on how to explore biological potentials by external and internal manipulation are elaborated as well.	
Schedule	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Understanding marine biodiversity</li> <li>3. Tropical marine region</li> <li>4. Distribution of tropical marine organism</li> <li>5. Marine biodiversity in coral triangle region</li> <li>6. Taxonomical approach on tropical marine biodiversity</li> <li>7. Species diveristy, Genetic diversity, Ecosystem diversity</li> <li>8. Conservation of tropical marine organism</li> <li>9. Marine protected area</li> <li>10. Laboratory and field Practices</li> </ol>	
Important items:	To understand distribution, biodiversity of tropical waters. Taxonomical approach of some marine organism to know the reach of coral triangle regionbio diversity. Conservation of marine species, genetic and ecosystem	
Self-studies and other devices	Students should search related lecture topics through internet and answering some problems. Library task.	
Textbooks	Prepared by lecturers using recent references	
Requisites' to take subject:	Unconditional and no prerequisite	
Assessment method	Analysis operation, use of some related laboratory equipments, understanding the principles and submitted report in each time is assessed	
Evaluation criteria	Pass if reports and continuous assessment of participation to practices are not less than 60%. Passing grade is determined according to examination score, assignment and percentage attendance in class	
Relevant matters	Conducted in English (Dictionary is required) , Laptop/Computer	

**Graduate school of fisheries and marine science,  
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Subject title	Tropical Aquaculture	Semester 2 Credit 3
Key words	Tropical aquaculture, hatchery, fish farming, shellfish farming, Crustacean farming, overharvest, fish feed,	
Professor Lecturer	Dr. Reiny A. Tumbol.	
Contact Office	Faculty of Fisheries and Marine Science, Jl. Kampus Unsrat Bahu, Manado – 95115. Indonesia	
Contact Hours	After Class	
Target	To provide students with a general understanding of tropical aquaculture, to give a comparative knowledge of the techniques used for culturing various tropical aquatic species and to enable students to understand the environmental demands including aspects of pollution and disease for sustainable aquaculture.	
Course description	The course will focus on rearing of aquaculture species relevant to tropical environment. The description of the course will be described by the professor and the students are required to search for relevant literatures.	
Schedule	<ol style="list-style-type: none"><li>1. Introduction</li><li>2. Aquaculture principal and practice</li><li>3. Feeds and Nutrition</li><li>4. Propagation and Hatchery Techniques</li><li>5. Genetics and stock improvement</li><li>6. Finfish culture</li><li>7. Crustacean culture</li><li>8. Shellfish culture</li><li>9. Production and evaluation Report</li><li>10. Aquatic Pathobiology/Diseases of warm water fish</li><li>11. Sustainable aquaculture</li><li>12. Presentation and discussion</li><li>13. Presentation and discussion</li><li>14. Exam</li></ol>	
Important items:	Understanding current topics in tropical aquaculture and conduct a project	
Self-studies and other devices	Students should search related lecture topics through internet and answering some problems prepared by each lecturer.	
Textbooks	Prepared by lecturers using recent references	
Requisites' to take subject:	Unconditional and no prerequisite	
Assessment method	Class participation and performance in report writing and final project presentation	
Evaluation criteria	The assessment is based on the attendance of students in class and their participation in the discussion (70%), Submission of the reports (20%), project presentation (10%). Attendance should be not less than 80%.	
Relevant matters	Recent scientific journals preferably with impact factor. Recent related scientific text books)	

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Subject title	Marine Biopharmacy	Semester 2 Credit 3
Key words	Marine Pharmacognosy, Bioactive compounds, Secondary Metabolites, marine drugs candidate, Marine Organisms.	
Professor Lecturer	Prof Dr. Ir. Desy M.H. Mantiri,DES, DEA DR. Ir. Deiske A. Sumilat, M.Sc.	
Contact Office	Dean's Office or Laboratory of Marine Pharmaceutical	
Contact Hours	After Class	
Target	Students are expected to learn marine pharmacognosy from organisms which potential as marine drugs candidate, cosmetic .	
Course description	Marine Pharmacognosy will be explained by the professor and lecturer. Students are requested to search journals which relevant and write the review and report it.	
Schedule	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Past, Present and Future of Marine Pharmacognosy</li> <li>3. Marine Pharmacology: The Clinical Phase</li> <li>4. Bioactive compounds from Indonesian Marine Organisms</li> <li>5. Marine Sponges: Bioactive and Secondary Metabolites</li> <li>6. Marine Ascidians: A Promising Resources For Bioactive Compounds</li> <li>7. Marine Fungi and Bacteria</li> <li>8. Review and Discussion</li> <li>9. Marine Algae: Pharmacological Value for Food and Health</li> <li>10. Marine Microalgae Pharmacognosy</li> <li>11. Biosynthesis of Marine Natural Products</li> <li>12. Marine Natural Products Isolation and Detection</li> <li>13. Bioassay Technique for Marine Drug Developments</li> <li>14. Final Project Presentation and Discussion</li> <li>15. Final Project Presentation and Discussion</li> <li>16. Final Project Presentation and Discussion</li> </ol>	
Important items:	To understand current topics of pharmacognosy in marine natural products and conduct the research to obtained the drugs candidate from marine organisms	
Self-studies and other devices	Preparation of material for the classes and prepare the small research project and presentation	
Textbooks	Text provided for each class and students have to find relevant journal paper (up to date)	
Requisites to take subject:	Unconditional	
Assessment method	Class participation and performance in report writing, presentation and discussion	
Evaluation criteria	Pass if satisfactory participating in class, reporting and presentation	
Relevant matters	Conducted in English (Dictionary is required)	

**Graduate school of fisheries and marine science,  
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Subject title	Marine Biotechnology	Semester 2 Credit 3
Key words	Molecular potentials, gene expression, target protein, bioactive substances, bioremediation	
Professor Lecturer	Professor Inneke F M Rumengan Assistant Professor StenlyWullur Assistant Professor ElvyLikeGinting.	
Contact Office	Laboratory of Marine Biotechnology, Faculty of Fisheries and Marine Science	
Contact Hours	After Class	
Target	To lead students having more perspectives on biotechnology to explore and exploit molecular potentials of marine bioresources, especially on tropical species.	
Course description	The subject gives principles of research methodology for exploration and exploitation of the molecular potentials of marine organisms and remediation of contaminated ecosystem. Gene expression for some important target proteins is emphasized, and some methods on how to explore biological potentials by external and internal manipulation are elaborated as well.	
Schedule	<ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Perspectives on biotechnological scope</li> <li>3. Molecular potentials</li> <li>4. Gene expression for some important target proteins</li> <li>5. Exploration and exploitation of molecular potentials for developing biomaterials</li> <li>6. Biological potentials of important marine organisms</li> <li>7. External manipulation of potential marine organisms</li> <li>8. Internal manipulation of potential marine organisms</li> <li>9. Bioremediation</li> <li>10. Laboratory Practices</li> </ol>	
Important items:	To understand molecular potentials and methods to explore them, and to explore by molecular approaches, and to exploit biological potentials by external and internal manipulation.	
Self-studies and other devices	Students should search related lecture topics through internet and answering some problems prepared by each lecturer.	
Textbooks	Prepared by lecturers using recent references	
Requisites' to take subject:	Unconditional and no prerequisite	
Assessment method	Analysis operation, use of some related laboratory equipments, understanding the principles and submitted report in each time is assessed	
Evaluation criteria	Pass if reports and continuous assessment of participation to practices are not less than 60%. Passing grade is determined according to examination score, assignment and percentage attendance in class	
Relevant matters	Conducted in English (Dictionary is required)	

**Graduate school of fisheries and marine science,  
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Subject title	Integrated Tropical Coastal Zone Management	Semester 2 Credit 3
Key words	Integrated tropical coastal zone management, concept tropical coastal planning and management, tropical coastal management and planning techniques, case study of tropical coastal zone management in South-East Asian countries	
Professor	Prof. Markus T. Lasut	
Contact Office	Dept. of Marine Science, Faculty of Fisheries and Marine Science	
Contact hours	Monday to Friday (10.00 – 16.00)	
Target	To let the students understand: the current topic in tropical coastal zone management and to improve ability to overcome the tropical coastal management cases	
Course description		
Schedule	<ol style="list-style-type: none"> <li>1. Introduction to the course and its requirements</li> <li>2. Overview of current tropical coastal management issues</li> <li>3. The imperative of tropical coastal zone management</li> <li>4. Concept of tropical coastal planning</li> <li>5. Concept of tropical coastal management</li> <li>6. Administrative arrangement for tropical coastal planning and management</li> <li>7. Major tropical coastal management and planning techniques: Administrative aspect</li> <li>8. Major tropical coastal management and planning techniques: Social aspect</li> <li>9. Major tropical coastal management and planning techniques: Technical aspect</li> <li>10. Tropical Coastal Management planning</li> <li>11. Dynamic of tropical coastal zone management</li> <li>12. Case study: Bunaken National Park, Indonesia</li> <li>13. Field trip observation</li> <li>14. Student presentation</li> <li>15. Group presentations</li> <li>16. Overall discussion</li> </ol>	
Important items	Cases in tropical coastal zone management and planning in South-East Asian countries, tropical coastal management and techniques.	
Self-studies and other advices	Summarizing journal articles and preparing paper; preparing personal and group presentation; and preparing discussion	
Textbooks	Handout is prepared by the lecturer; textbooks; and relevant journal papers.	
Requisites to take subject	none	
Assessment method	Class participation; performance in paper writing; participation in student and group presentations; participation in discussion	
Evaluation criteria	Pass if satisfactory reporting and participating into presentation and discussion are not less than 80% of classes	
Relevant matters	Conducted in English for all classes	