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**Course Name: GIS APPLICATION IN MARINE RESOURCE MANAGEMENT**

**Number of credits:** 4,5 ECTS

**Period:** Fall/spring semester

<b>Coordinator</b>	Faculty of Marine Resource Management
<b>Credits</b>	4,5 ECTS
<b>Lecturers</b>	Dr. Le Thi Kim Thoa
<b>Level</b>	Undergraduate
<b>Host institution</b>	Ho Chi Minh City University of Natural Resources and Environment
<b>Course duration</b>	1 semester (the classes will be scheduled in accordance with the university timetable)
<b>New/revised</b>	Revised ( 35%)

**Summary**

The course of GIS application in marine resource management is a subject that equip students with the basic knowledge of database management and necessary skills in understanding, exploiting and applying an integrated technology that has been widely used in many fields, especially in marine resources management. The module provides students with skills in database design, GIS application to develop and the create thematic maps to serve in the field of marine resource management.

**Target student audiences**

BSc. students majoring in Marine Resource Management

**Prerequisites**

Required courses (or equivalents): NO

**Aims and objectives**

The main course objective is to equip students with knowledge of:

- Understanding the basic knowledge of database management and applications of GIS in marine resource management
- Exploring various sources of geographic data and the types of spatial data, including vector and raster data.
- How to collect and input geographical data into GIS system.
- Techniques for processing and analysing spatial data (spatial queries, buffering, overlays...)
- Methods for visualizing and presenting spatial data
- Organising and managing spatial datasets, databases.
- Final GIS project and present student’s findings.

**The Authentic Tasks are:**

The course will provide students with knowledge of GIS fundamental and its application in marine resources management. Exploring various sources of geographic data and the types of spatial data, and how to visualize and present spatial data.

**General learning outcomes:**

By the end of the course, successful students will:

Knowledge

- Understanding the theoretical basis of GIS and applications of GIS in marine resource management
- Exploring various sources of geographic data and the types of spatial data, including vector and raster data.



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- Inputing geographical data into GIS system.
- Visualizing, analysing and presenting spatial data

#### Comprehensive

- Different type of spatial data.
- Techniques for processing spatial data
- Methods for visualizing and presenting spatial data

#### Application

- Apply GIS to pilot project to solve the specific problem in the field of marine resources management.

#### Analysis

- Analysing spatial data in the real world

### Overview of sessions and teaching methods

The course will make most of interactive and self-reflective methods of teaching and learning and, where possible, avoid standing lectures and presentations.

### Learning methods

- Video presentations
- Surveys, assignment
- Project Based Learning
- Literature review
- Query
- Team work

### Course outline

#### Week topics

<b>Week 1</b>	Systematize basic knowledge of GIS and the ability to apply GIS in marine resources management
<b>Week 2</b>	Some GIS software and the content and data structure of the GIS database
<b>Week 3</b>	Get familiar with some basic functions in ArcGIS
<b>Week 4</b>	Building a geodatabase
<b>Week 5+6</b>	Visualizing database
<b>Week 7+8</b>	Database query
<b>Week 9+10</b>	Spatial analysis
<b>Week 11</b>	Database conversion
<b>Week 12</b>	Map editor
<b>Week 13+ 14+ 15</b>	Building database

### Course Schedule

#### Topic 1 - Systematize basic knowledge of GIS and the ability to apply GIS in marine resources management

Learning objectives	<ul style="list-style-type: none"> <li>• Introduction to GIS</li> <li>• GIS application in different fields, specific in marine resources management</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Understanding and able to express the definition of GIS and its components and functions.</li> <li>• Understanding the role of GIS application in marine resources management.</li> </ul>



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Student deliverables	Homework: Working in group and preparing some application of GIS in the field of marine resources management.
Topic materials	Lecture of GIS application in marine resources management
Outline	1.1. Geographic information, geographic information system 1.2. Role and capabilities of GIS 1.3. GIS applications in marine resource management

**Topic 2- Some GIS software, content and data structure of GIS database (10 % revised)**

Learning objectives	<ul style="list-style-type: none"> <li>Familiar with different types of GIS products available.</li> <li>Understanding the data structure of GIS</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>Distinguish different types of GIS products available</li> <li>Demonstrate the data structure of GIS</li> </ul>
Student deliverables	Exercise: learn about GIS software packages and their strengths for specific purposes.
Topic materials	Lecture of GIS application in marine resources management
Outline	2.1. Some commercial GIS software 2.2. Some open source GIS software 2.3. Introduction to ARCGIS Desktop 2.4. Standard database format of ARCGIS

**Topic 3 - Get familiar with the ARCGIS interface (10 % revised)**

Learning objectives	<ul style="list-style-type: none"> <li>Get familiar with the ARCGIS interface</li> <li>Some basic display functions in ArcMap</li> <li>Get familiar with ARCMAP with Ho Chi Minh database</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>Open and perform basic operations on a map to work with the given geographic data to create a map.</li> <li>Understand geographic data (organization, spatial representation, attributes)</li> </ul>



Student deliverables	<ul style="list-style-type: none"> <li>Exercise: practice in class and homework</li> </ul>
Topic materials	Lecture of GIS application in marine resources management
Outline	3.1. Get familiar with the ARCGIS interface 3.2. Some basic display functions in ArcMap 3.3. Practice in class with Ho Chi Minh database

**Topic 4: Building geodatabase (10 % revised)**

Learning objectives	<ul style="list-style-type: none"> <li>Understand what is geodatabase and how to create a geodatabase</li> <li>Create data into geodatabase</li> <li>Import data into geodatabase</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>Understanding the role of geodatabase.</li> <li>Able to create a geodatabase and import data into geodatabase.</li> </ul>
Student deliverables	<ul style="list-style-type: none"> <li>Exercise: practice in class and homework</li> </ul>
Topic materials	Lecture of GIS application in marine resources management
Outline	4.1. Geodatabase definition, the role of geodatabase 4.2. Create a geodatabase 4.3. Input data into geodatabase 4.4. Import data into geodatabase

**Topic 5- Visualising database (35 % revised)**

Learning objectives	Display spatial and attribute data in different types of representing categories, quantities, multiple attributes, charts
Learning outcomes	Able to display data with various types of representation.
Student deliverables	<ul style="list-style-type: none"> <li>Exercise: practice in class and homework</li> </ul>
Topic materials	Lecture of GIS application in marine resources management
Outline	5.1. Displaying spatial and attribute data 5.2. Visualising data in categories 5.3. Visualising data in quantities 5.4. Visualising data in multiple attributes 5.5. Visualising data in charts

**Topic 6- Database queries (35 % revised)**

Learning objectives	Understand data queries and data analysis in GIS and perform some basic operations in ARCGIS
Learning outcomes	Understand and execute queries based on attribute-related conditions - Understand and perform queries based on spatial relationships
Student deliverables	Exercise: practice in class and homework
Topic materials	Lecture of GIS application in marine resources management
Outline	6.1. Query data by attribute database 6.2. Query data by spatial database 6.3. Query data by both spatial and attribute database



**Topic 7- Spatial analysis (35 % revised)**

Learning objectives	Understand data analysis in GIS and perform some basic operations in ARCGIS.
Learning outcomes	Understand and perform some basic analysis: buffering, overlay, intersect...
Student deliverables	Exercise: practice in class and homework
Topic materials	Lecture of GIS application in marine resources management
Outline	7.1. Layer overlap analysis 7.2. Analyze spatial relationships

**Topic 8- Map conversion (45 % revised)**

Learning objectives	Understand data in different data format and convert them into shapefile in ARCGIS.
Learning outcomes	Able to convert different data format and convert them into shapefile in ARCGIS.
Student deliverables	Exercise: practice in class and homework
Topic materials	Lecture of GIS application in marine resources management
Outline	8.1. Convert data from AutoCAD to Shape file 8.2. Convert data from Mapinfo to Shape file 8.3. Convert data from Microstation to Shape file

**Topic 9- Map editor (30 % revised)**

Learning objectives	Understand how to export a complete map for printing (paper format) or export maps in formats such as: image, .PDF... (digital format)
Learning outcomes	Able to create and export a complete map for printing or export maps in digital formats in ARCGIS.
Student deliverables	Exercise: practice in class and homework
Topic materials	Lecture of GIS application in marine resources management
Outline	9.1. Introducing the components of the map 9.2. Map page layout: create and arrange map elements on the printed page 9.3. Print and export map pages

**Topic 10- Building database (15 % revised)**

Learning objectives	<ul style="list-style-type: none"> <li>• Visualize and perceive different spatial data sources in GIS</li> <li>• Initialize GIS spatial data</li> <li>• Edit GIS spatial data</li> </ul>
Learning outcomes	<ul style="list-style-type: none"> <li>• Able to practice operations to work and edit spatial data such as create new data layer; create new objects; edit spatial objects.</li> <li>• Able to create and edit GIS data from different sources: GIS data source; Paper map data source; direct measurement data.</li> </ul>
Student deliverables	Exercise: practice in class and homework
Topic materials	Lecture of GIS application in marine resources management
Outline	10.1. Building dataset from the data tables 10.2. Building a database from remote sensing images 10.3. Building a database from paper maps

## Literature

[1] Lecture of GIS application in marine resources management

### Recommended:

[2] Tran Vinh Phuoc, 2003, General GIS - theoretical part, Ho Chi Minh City National University Publishing House, Ho Chi Minh City.

[3] Nguyen Kim Loi, Tran Thong Nhat, 2008, Geographic Information System, Publishing House. Agriculture, Ho Chi Minh City.

[4] Dang Van Duc, 2001, Geographic Information System, Hanoi Science and Technology Publishing House, Hanoi.

[5] Tran Trong Duc, 2010, Basic GIS, Publishing House. City National University. Ho Chi Minh City, Ho Chi Minh City.

[6] Tor Bernhardsen, 2002, Geographic Information Systems – An Introduction, 3rd edition, John Wiley & Son.

[7] Jochen Albrecht, 2007, Concepts and techniques in GIS, Sage.

[8] Paul Longley, Michael Goodchild, David Maguire, David Rhind, 2004, Geographic Information and Science, 2nd edition, John Wiley & Son.

[9] Rolf A. de By et al., 2001, Principles of geographic information systems – An introductory textbook, ITC, Netherland.

## Course workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)
<b>In-class activities (45 hours)</b>			
Lectures (2 hours/ week)	Understanding theories, concepts, methodology and tools	Class participation	20
Moderated in-class discussions (1 hours/ week)	Understanding the role of GIS and its application	Class participation and preparedness for discussions	10
In-class assignments, homework assignment ( 0,5 hours/ week)	Practicing in the computer lab	Class participation and preparedness for assignments	5
Reading and discussion of assigned papers for	Familiarity with and ability to critically and creatively discuss key	Class participation,	5



seminars and preparation for lectures	concepts, tools and methods to visualyse database	creative and active contribution to discussion	
Group presentation	Ability to interpret data, to analyze audience, and to use the concepts, tools, and methods for visualing, analysing database	Quality of group assignments and individual presentations	5
<b>Independent work (90 hours)</b>			
Group work: - Contribution to the group case-study projects - Contribution to the preparation and delivery of individual presentation	Ability to interpret data, to analyze audience, and to use the concepts, tools, and methods for communicating information to all participants	Quality of group assignments and individual presentations	30
Course group assignment	Working in group and preparing pilot study	Quality of group assignments and individual presentations	30
Group presentation	Ability to interpret data, to analyze audience, and to use the concepts, tools, and methods for analysis database	Quality of group assignments and individual presentations	30
<b>Total</b>			<b>135</b>

### Course Assignments

Course assignments will constitute a multi-part project:

- Assignment #1 - (Home work): working in group and preparing some applicaion of GIS the the field of marine resources management.
- Assignment #2 - (Home work): Working in group and preparing about GIS software packages and their strengths for specific purposes.
- Assignment #3 - (Home work): Working in group visualysing databases
- Assignment #4 - (Home work): Working in group preparing database queries
- Assignment #5 - (Home work): Working in group preparing database analysis
- Assignment #6 - (Home work): Working in group preparing map editor
- Assignment #7 - (Home work): Working in group preparing pilot dtudy



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## **Grading**

The students' performance will be based on the following:

### **Assessment**

- Progress assessment (40%):
  - Exercise in class (10%):
  - Homework (15%):
  - Semi- examination (15%)
- Final assessment (60%):
  - Group report (30%): The students will be divided into groups of 4-5 students and choose 1 topic and complete the group project report according to the specific requirements of each topic.
  - Final examination (30%)

### **Evaluation**

A (8,5 - 10)

B (7,0 - 8,4)

C (5,5 - 6,9)

D (4,0 - 5,4)





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