3.2 ĐỀ CƯƠNG TIẾNG ANH

3.2.1) Các môn thuộc khối kiến thức đại cương

1) TN101: Fundamental Chemistry I

1	**Title**: TN101: Fundamental Chemistry I
2	**Number of Credits:** 3
3	**Instructors** Dr. Bui Thi Buu Hue
4	**Distribution of Time** Workload: Lectures: 3 lecture hours * 15 weeks = 45 lecture hours Self-Study: 2 lecture hours * 15 weeks = 30 lecture hours
5	**Prerequisites:** Open for all students having the high school courses on chemistry, mathematics, physics and informatics
6	**Course Objectives** The major purpose of this course is to provide core topics that are necessary for a good foundation in general chemistry.
7	**General Course Contents** The course will focus on the following subjects: • Atomic structure and the periodic table • Chemical bond and molecular structure • Chemistry of the representative elements, transition metals and complex compounds. • Introduction of Kinetic Chemistry • Thermal Chemistry • Chemical Equilibrium • Solution • Electrochemistry
8	**Required Responsibility for Student** - Lecture/Class attendance: students must attendant at least 80% of lectures - Mid-term Test: students must take mid-term test - Final Examination: students must take final exam
9	**Reading Materials** a) Steve S. Zumdahl, 1993, Chemistry, 3th Ed. DC. Heath & Company. Lexington, MA. b) R. Chang, 1996, Essential Chemistry, McGraw-Hill, Inc. c) Jean B. Umland, 1993, General Chemistry, West Publishing Company. d) Bùi Thị Bửu Huê, 2004, ***Giáo trình Hóa Đại Cương A_1***, Khoa Học.
10	**Criteria of Evaluation** The final examination will be conducted at the end of the course. The final course grade is determined by the sum of the points obtained by the mid-term test and final examination.
11	**Grading System** - Mid-term test: 30% - Final Exam: 70%

12 **Detail Description of Course**

Atomic structure and the periodic table

a) The modern view of atomic structure
b) Quantum mechanics and atomic theory
c) Periodic law and the periodic table

Chemical bond and molecular structure

a) Molecule and chemical bonds
b) Ionic bonding
c) Covalent Bonding
d) Intermolecular forces
e) V. Metallic bonding

The representative elements: Group 1A through 4A

a) The group IA elements
b) Hydrogen
c) The group IIA elements
d) The group IIIA elements
e) The group IVA elements

The representative elements: Group 5A through 8A

a) The group VA elements. Chemistry of nitrogen and phosphorus
b) The group VIA elements. Chemistry of oxygen and sulfur
c) Environmental chemistry. Group VIIA
d) Chemistry of the group VIIA and VIIIA elements

Transition metals and the chemistry of complex compounds

a) The transition metals: a survey
b) Coordination compounds: nonmenclature, structure, isomerism
c) Bonding in complex ions: the localized electron model, the crystal field model.
d) The biologic importance of coordination compounds

Thermodynamics

a) Introduction
b) The first law of thermodynamics: Entalpy
c) The second laws of thermodynamics: entropy and free energy

Chemistry Kinetics

a) Rates of Reations
b) Rate laws
c) Factors affect the reaction rate
d) Catalyst

Chemical Equilibrium

a) Introduction to Chemical Equilibria
b) Equilibrium Constants and Equilibrium Constant Expressions

c) Le Chatelier's Principle

Solution

a) Introduction to dispersing systems
b) Types of solution concentration
c) Colligative properties
d) Acid-Base
e) Solubility Equilibria

Oxidation-Reduction Reations and Electrochemistry

a) Oxidation-Reduction Reations
b) Voltaic Cells
c) Electrolytic Cells

2) TN102: Fundamental Chemistry I Laboratoy

1	**Title**: TN102: Fundamental Chemistry 1 Lab
2	**Number of Credits:** 1
3	**Instructors** Dr. Bui Thi Buu Hue
4	**Distribution of Time** Workload: Laboratory: 5 lecture hours * 6 weeks = 30 lecture hours
5	**Prerequisites:** Fundamental Chemistry 1
6	**Course Objectives** To illustrate basic knowledge on general chemistry including chemical equilibrium, thermodynamics, chemical kinetics, acid-base and inorganic chemistry.
7	**General Course Contents** The course will provide students with experiments focusing on the chemical equilibrium in solution, enthalpy change associating with a chemical reaction, reaction rate, chemistry of non-metals and their compounds and chemistry of transition metals and complex compounds.
8	**Required Responsibility for Student** Students are required to attent all the experimental hours of the course and write complete reports.
9	**Reading Materials** a) Mai Viet Sanh, 1997, Giao trình thực tập Hóa Đại Cương A2, Khoa Khoa Học. b) Mai Viết Sanh, 1997, Giáo trình Thực tập Hóa Vô cơ và Hữu cơ Đại cương A3, Khoa Khoa Học.
10	**Criteria of Evaluation** The final examination will be conducted at the end of the course. The final course grade is determined by the sum of the points obtained by the final examination and the complete reports.
11	**Grading System** Report: 30% Oral exam: 70%
12	**Detail Description of Course** Solubility Equilibria Calorimeter Chemical equilibrium Reaction rate Chemistry of non-metals and their compounds Chemistry of transition metals and coordination compounds

3) TN103: Fundamental Chemistry II

1 **Course Title**:
TN103: Fundamental Chemistry II

2 **Number of Credits:** 2

3 **Instructor**
Dr. Le Thanh Phuoc

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Private Study:	3 lecture hours * 10 weeks = 30 lecture hours

5 **Prerequisites:**
Fundamental Chemistry II

6 **Course Objectives**
This course aims to supply the student with:
a) most basic knowledge about organic compounds their physical, chemical properties, nomenclature and preparations.
b) overview about isomers and chiral in organic chemistry
c) concept of structure, solubilities, and acid-base properties of organic substances

7 **General Course Contents**
a) Some general characteristics of organic molecules
b) Chemistry of hydrocarbons
c) Chemistry of functional Groups: Alcohols and Ethers.
d) Componds with a carbonyl group
e) Introductions to Biochemistry, Proteins, Carbohydrates, Nucleic Acids.

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% (or 24 hrs) of lectures
- Lab. Attendance:
- Mini Projects/Assignment:
- Discussion and/or Seminar:
- Mid-term Test: 30%
- Final Examination: 70%

9 **Reading Materials**
a) Do Thi My Linh, 2000, Organic Chemsitry Lecture Notes,, Cantho University
b) Brown, Lemay, and Bursten, 2003, Chemistry: the Central Science, 9th edition, Pearson-Prentice-Hall
c) Seyhan N. Ege, 1999, Organic chemistry, Structure and reactivity, 4th edition. Houghton Mifflin Company .

10 **Criteria of Evaluation**
Homework Assignments and Final Examination

11 **Grading System**
- Homework Assignments: 30%
- Final Exam: 70%

12 **Detail Description of Course**

a) Some general characteristics of organic molecules
- The structures of organic molecules
- The stabilities of organic substances
- Solubilities and acid-base properties of organic substances

b) Introductions to hydrocarbons: Alkanes
- Structures of alkanes
- Structural isomers
- Nomenclatures of alkanes
- Cycloalkanes
- Reactions of alkanes

c) Unsaturated hydrocarbons
- Alkenes
- Alkynes
- Addition reactions of alkenes and alkynes
- Mechanism of addition reactions
- Aromatic hydrocarbons

d) Functional Groups: Alcohols and Ethers
- Alcohols
- Ethers

e) Componds with a carbonyl group
- Aldehydes and ketones
- Carboxylic acids
- Amines and amides

f) Stereochemistry - Chiral in organic chemistry
- Chirality
- *R* and *S* nomenclature of asymmetric carbon atoms
- Fischer projections
- Diastereomers and meso compounds

g) Introductions to Biochemistry: Proteins
- Amino acids
- Polypeptides and Proteins
- Protein structure

h) Carbohydrates
- Monosaccharides and disaccharides
- Polysaccharides

i) Nucleic Acids
- Ribonucleosides and ribonucleotides
- Deoxyribose and the structure of deoxyribonucleic acid

4) TN104: Fundamental Chemistry II Laboratoy

1 **Title**:
TN104: Fundamental Chemistry II Lab.

2 **Number of Credits:** 1

3 **Instructor:**
Dr. Le Thanh Phuoc

4 **Distribution of Time**
Workload: Laboratory: 5 lecture hours * 6 weeks = 30 lecture hours

5 **Prerequisites:** General chemistry laboratory I

6 **Course Objectives**
This course aims to supply the student with:
a) Most basic knowledge about organic laboratory techniques
b) The normal scale as well as microscale techniques used in organic chemistry laboratory to determine of functional groups and will perform a few synthetic experiments.
c) Measuring methods of Melting Points, Boiling Points and recrystalization of the prepared products.

7 **General Course Contents**
a) Qualitative analysis of organic compounds
b) Sulfonation, esterification and aldol condensation
c) Chemsitry of nonmetals and their compounds
d) Chemsitry of transition metals

8 **Required Responsibility for Student**
- Lab. Attendance: 100% of experiments
- Discussion: 100%
- Final Examination: requisite

9 **Reading Materials**
1. Kenneth L. Williamson, 1994. Macroscale and Microscale Organic Experiments, Second Edition, Mount Holyoke College.
2. Arthur I, 1989. Volgel's texbook of practical organic chemistry, 5th ed., Prentice Hall.
3. Phan Tống Sơn, Lê Đăng Danh, 1977. Thực tập hóa học hữu cơ- tập 1,2, NXB Khoa học và Kỹ thuật Hà Nội .
4. Ngô Thị Thuận, 1999. Thực tập hóa học hữu cơ, NXB Đại Học Quốc Gia Hà Nội.

11 **Grading System**
- Lab reports: 30%
- Oral. Exam: 70%

12 **Detail Description of Course**
a) Qualitative analysis of organic compounds
b) Sulfonation reaction: Preparation of natri *p*-toluene sunfonat
c) Esterification reaction: Preparation of Aspirin and ethyl acetate
d) Aldol condensation: Preparation of benzal acetophenon
e) Chemsitry of nonmetals and their compounds
f) Chemsitry of transition metals

5) TN105/TN106: Analytical Chemistry

1 **Title**:
TN105/TN106: Analytical Chemistry

2 **Number of Credits:** 2

3 **Instructor**
Msc. Phan Thanh Chung

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours * 15 weeks = 30 lecture hours
	Private Study:	2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:** Foundation Chemistry I and II

6 **Course Objectives**
The major objective of this course is to provide a basic theory for studying chemical equilibrium and calculating concentrations of components and other relative quantities in electrolytic solutions. The knowledge of this course is the theoretical basis of other subjects included or related to analytical chemistry.

7 **General Course Contents**
a) Acid/Base Equilibrium – Neutralization Titrations
b) Complex- Formation Equilibrium – Complex-Formation Titrations
c) Oxidation/Reduction Equilibrium - Oxidation/Reduction Titrations
d) Pricipitation Equilibrium – Precipitation Titrations

8 **Required Responsibility for Student**
- Lecture/Class attendance: Not mandatory
- Exercises: Self-study
- Mid-term Test: 100% attendance
- Final Examination: 100% attendance

9 **Reading Materials**
a) Hoàng Minh Châu, Từ Văn Mạc, Từ Vọng Nghi (2007). Cơ sở Hóa học phân tích,
b) Nhà xuất bản Khoa học Kỹ thuật.
c) Phan Thành Chung (1999). Bài giảng hóa phân tích, Đại học Cần thơ.
d) Douglas. A. Skoog, Donal M. West, F. James Holler (1992). Fundamentals of Analytical Chemistry. Saunder College Publishing.
e) Nguyễn Tinh Dung (1981). Hóa học phân tích. Nhà xuất bản Giáo dục, Hà nội.

11 **Grading System**
- Midterm Exam: 30%
- Final Exam: 70%

12 **Detail Description of Course**

a) An Introduction to Analytical Chemistry
- Solution.
- Concentration
- Chemical Laws
- Method of ionic equilibrium calculation.

b) Acid/Base Equilibrium

- Theory
  - Bronsted – Lowry's Theory
  - Monofunctional Acid/Base Solutions
  - Polyfunctional Acid/Base Solutions
  - Salt Solutions
  - Buffer Solutions
  - Multiple Charged Ion Solutions

- Acid/Base Titrations
  - Principle
  - Acid/Base Indicators
  - Titration of a Strong Acid with a Strong Base

b) Complex- Formation Equilibrium

- Theory
  - Introduction to Complex
  - Stability and Instability Constants of Complex.
  - Equilibrium Concentrations in Complex-Formation Solution
  - Effects of pH and Other Complexing Agents on Complex-Formation Equilibrium
  - Complex-Formation With Organic Reagents

- Complex-Formation Titrations
  - Complexons
  - Effects of the Medium
  - Indicators for EDTA Titrations
  - EDTA Titration Curves

c) Oxidation/Reduction Equilibrium

- - Theory
    - Introduction to Oxidation/Reduction Reaction
    - Formation of Oxidation/Reduction Reaction with Ion-Electron Balance Method
    - Oxidation/Reduction Potential
    - Potential of the Mixture of an Oxidant and a Conjugate Reductant
    - Equilibrium Potential of a Mixture of an Oxidant and a Reductant
    - Equilibrium Constant for Oxidation/Reduction Reaction

- Oxidation/Reduction Titrations
  - Introduction to Redox Titrations
  - Methods of Redox Titrations
  - Indicators for Redox Titrations
  - Redox Titration Curves

d) Precipitation Equilibrium

- Theory
  - Solubility Product Constant and Solubility
  - Factors Effect on Solubility

    - Co- Precipitation
    - Precipitate Dissolve

- Precipitation Titrations
    - Principle
    - Precipitation Titrations with Silver Nitrate
    - Argentometric Methods – Mohr's Method
    - Gravimetric Method

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6) TN107 (BIOL1020): Principles of Biology

1 **Title**:
TN107 (BIOL 1020): Principles of Biology

2 **Number of Credits:** 2

3 **Instructors:**
Mr. Bui Tan Anh

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Private Study:	2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:** none

6 **Course Objectives**
This course will acquaint students with the key cellular and subcellular processes underlying the activity of living systems. Topics include the structure, function, and synthesis of macromolecules, the cellular conversion and use of energy, the replication, transmission, and expression of genetic information.

The primary goals of the course are: 1) to provide students with an appreciation for both the order and complexity inherent in cellular function and 2) to prepare students for more advanced coursework and/or self-directed study in biology and biotechnology.

7 **General Course Contents**
a) Macromolecule synthesis
b) Structure and Function of the Cell
c) Energy metabolism
d) Principles of genetics

8 **Required Responsibility for Student**
a) Lecture/Class attendance: not allow to absent more than 20% of lectures
b) Lab. Attendance: Mandatory
c) Discussions: Mandatory

9 **Reading Materials**
a) Campbell, N.A, J. B. Reece, E.J. Simon 2004. *Essential Biology*. 2nd Ed. The Benjamin/Cummings Pub. Com., Inc. CA.
b) Campbell, N.A, J. B. Reece 2004. *Biology*. 7th Ed. The Benjamin / Cummings Pub. Com., Inc. CA.
c) Freeman, S. 2005. *Biological Science* 2nd Ed. Pearson Education Inc.
d) 4. Purves, W. K., D. Sadava, G. H. Orians, H. C. Heller, 2003. *Life, The Science of Biology*, 7th Ed. Sinauer Associates and W. H. Freeman.

10 **Criteria of Evaluation**
Missed lecture or discussion will be lost 0,5 point

11 **Grading System**
- Midterm exam: 30 %
- Final Exam: 70 %

12 **Detail Description of Course**

Structure and Function of Macromolecules

a) Polymer Principles
b) Carbohydrates-Fuel and Building Material
c) Lipids-Diverse Hydrophobic Molecules
d) Proteins-The Molecular Tool of the Cell
e) Nucleic Acids-Informational Polymers

Cell structure and Function

a) An Overview
b) Structure of Eucaryotic Cell
c) Structure od Procaryotic Cell

Membrane Structure and Function

a) Membrane structure
b) Traffic Across Membranes
- 2.1. Passive Transport
- 2.2. Active Transport

c) Exocytosis and Endocytosis

Cellular Respiration

a) Principles of Energy Harvest
b) Aerobic Cellular Respiration
c) Anaerobic Cellular Respiration
d) Metabolic Processing of Lipid and Protein

Photosynthesis

a) The Logic of Leaf Design
b) The light reaction
c) The dark reactions – Calvin cycle
d) C4 and CAM Photosynthesis

The Cell Cycle

a) Structure and Function of Chromosome
b) The Mitotic Cell Cycle
c) Meiosis and Sexual Life Cycles

The Molecular Basic of Inheritance

a) DNA as the Genetic Material
b) Nucleic Acids Structure
c) DNA Replication and Repair

Protein Biosynthesis

a) The Connection Between Genes and Proteins
b) The Synthesis and Processing of RNA- Transcription
c) The Synthesis of Protein- Translation
d) Regulation of Gene expression

DNA Technology

a) Recombinant DNA
b) Electrophoresis
c) The Polymerase Chain Reaction
d) Application of DNA Technology

7) TN108: Principles of Biology Laboratory

1 **Title**:
TN108: Priciples of Biology Laboratory

2 **Number of Credits:** 1

3 **Instructor**
MSc. Bui Tan Anh

4 **Distribution of Time**
Workload:
5 lecture hours * 6 weeks = 30 lecture hours

5 **Prerequisites:** Principles of Biology

6 **Course Objectives**
This course provides some basic skills in General Biology. The experiments being related to main concepts studied in Principles of Biology..

7 **General Course Contents**
The Microscope
Cell Structure
Enzyme Activities
Cell Division
Chromosome morphology

8 **Required Responsibility for Student**
- Lab. Attendance is mandatory
- Doing practical report

9 **Reading Materials**
a) P. Abramoff, R. G. Thomson, 1994, ***Laboratory Outlines in Biology*** VI. W.H. Freeman & Co. New York.
b) S. E. Gunstream, 2001, ***Biological Exploration***, 4th ed. Pearson Prentice Hall.

10 **Criteria of Evaluation**
Missed labworks will be not allowed to take the final exam.

11 **Grading System**
- Practical report: 30 %
- Final Exam: 70 %

12 **Detail Description of Course**
The microscope
Animal and Plant Cell
Starch Hydrolysis By Amylases
Mitosis
Meiosis
Salivary Gland Chromosomes in *Drosophila*

8) TN109 (MATH 1610): Advanced Mathematics

1 **Course name:**
TN109 (MATH 1610): Advanced Mathematics

2 **Number of Credits:** 2

3 **Instructor:**
Dr. Nguyen Huu Khanh

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Private Study:	3 lecture hours * 10 weeks = 30 lecture hours

5 **Prerequisites:**
Mathematics in high school

6 **Course Objectives**
This course aims to supply the student with most basic knowledge about Advanced Mathematics: systems of equations, functions, limits, differentiation, integrals, series, functions of several variables.

7 **General Course Contents**
Systems of equations
Functions and limits
Differentiation and integrals
Series and functions of several variables.

8 **Required Responsibility for Student**
- Class attendance: 100% of experiments
- Assignment / exercise: 100%
- Mid-term exam: requisite
  Final Examination: requisite

9 **Tài liệu học tập (ghi 3-4 tài liệu)**

a) Barnett and R. Ziegler (1989). Applied Mathematics, Dellen Publishing Company, 1989.
b) Boyce,E. and C. Diprima (1989). Calculus. John Wiley & Son, Inc.
c) Dams, A. (1995). Calculus. Addition-Wesley Publishers Limited, 3rd ed.
d) Goldstein, J., Lay and I. Schneider (2004). Calculus & Its Applications. Pearson Education, Inc..
e) Thomas, G. and R. Finney. Calculus, Addition-Wesley, 8th, 1992.
f) Nguyễn Đình Trí (1995). Toán học cao cấp, NXB GD.
g) Phan Quốc Khánh (2000). Phép tính vi phận. NXB GD 2000.

11 **Grading System**
- Assignment/exercise: 20%
- Mid-term Exam: 30%
- Final Exam: 50%

12 **Detail Description of Course**
a) Systems of linear equations

- System of linear equations and augmented matrices.
- Gauss-Jordan elimination.
- Matrices and matrix equations.

b) Functions, Limits, Continuity.
- Real numbers and the real line, intervals, absolute value of real numbers.
- Functions
- Limits
- Continuity

c) ***Derivatives***
- Tangent lines and their slopes, the concept and definition of derivative.
- Right- and left-hand derivatives.
- Differentiability in an interval.
- The relation between differentiability and continuity.
- Rules for differentiation.
- Differentiation of composite functions and inverse functions.
- Implicit differentiation.
- Derivatives of elementary functions.
- Higher order derivatives.
- Differentials.
- Mean value theorems.
- Indeterminate forms and L' Hospital's rule.
- Taylor's formula.
- Maxima and minima.
- Polar coordinates and parametric curves.
- Applications: rates of change, optimization problems, linear
- approximation problems.

d) Integrals
- Indefinite integrals.
- Definite integrals.
- Improper integrals.

e) Series
- Sequences and series.
- Power series.

f) Functions of several variables.
- Neighborhoods, regions, the definition of function, graph of a function.
- Limits and continuity.
- Partial derivatives, higher order partial derivatives.
- Gradient and directional derivatives.
- Differentials.
- Maxima and minima.

9) AQUA201 (ENGL1100): English for aquaculture I

1 **Title**:
AQUA201 (ENGL1100): English for aquaculture I

2 **Number of Credits:** 3

Instructors

3 A/Prof. Dr. Nguyen Anh Tuan and Dr. Vu Ngoc Ut

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours * 15 wks = 30 lecture hours
	Discussion/seminars:	1 lecture hours * 15 wks = 15 lecture hours
	Private Study:	2 lecture hours * 15 wks = 30 lecture hours

5 **Prerequisites:** Basic English

6 **Course Objectives**

This course aims to introduce students the methodologies to learn aquaculture and fisheries terms that will be used for reading references, listening lectures, giving talk and writing assignment and thesis.

7 **General Course Contents**

a) Introduce learning methodologies for technical terms
b) Review briefly on commonly used grammar in science
c) Introduce reading methodologies for technical papers, books,…
d) Improve speaking skills

8 **Required Responsibility for Student**

- Lecture/Class attendance: 80% of lectures
- Discussion and/or Seminar: 100%
- Mid-term test: requirement
- Final Examination: requirement

9 **Reading Materials**

a) Nguyễn Anh Tuấn, Lê Thanh Hùng và Nguyễn Thanh Phương (2005). Giáo trình tiếng Anh chuyên ngành Nuôi trồng Thủy sản. Nhà xuất bản Nông nghiệp.
a) Website of the World Aquaculture Society (www.was.org) – presentation of papers in various conferences
b) Scientific papers/articles will be supplied during the course

11 **Grading System**

- Homework Assignments: 15%
- Seminar/Class presentation: 20%
- Mid-term Exam: 15%
- Final Exam: 50%

12 **Detail Description of Course**

a) Introduction to learning methodologies for technical terms
c) Scope and definition of aquaculture
- Grammar review: noun
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Important culture species

d) Site selection for aquaculture
- Grammar review: Adjectives
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Typical aquaculture operarions

e) The fish pond environment
- Grammar review: Adverbs
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Free selective

f) Fish-rice systems
- Grammar review: Articles
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Aquatic weed control techniques

g) Nature and source of live food
- Grammar review: Prepositions
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Free elective

h) Culturing the rotifer
- Grammar review: Conjunctions
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Production of microalgae for aquaculture

i) Species combination and polyculture
- Grammar review: Infinitive
- Explanation of important terms
- Comprehensive reading and translating the text
- Supplementary reading article: Fee elective

10) AQUA202 (ENGL 1120): English for Aquaculture II

1. **Title**:
   AQUA202 (ENGL 1120): English for Aquaculture II

2. **Number of Credits:** 3 credits

3. **Instructors**
   A/Prof. Dr. Nguyen Anh Tuan and Dr. Vu Ngoc Ut

4. **Distribution of Time**

Workload:	Lectures:	1 lecture hours x 15 wks = 15 lecture hours
	Discussion/presentation:	2 lecture hours x 15 wks = 30 lecture hours
	Private Study:	2 lecture hours x 15 wks = 30 lecture hours

5. **Prerequisites:** Basic English

6. **Course Objectives**
   This course aims to introduce students methodology to approach aquaculture and fisheries terminologies that will be used for reading references, listening lectures, giving talk and writing assignment and thesis.

7. **General Course Contents**
   e) Introduce learning methods for technical terms/words (complicated words)
   f) Review briefly on commonly used grammar in science
   g) Introduce reading methods (scanning) for technical papers, books,…
   h) Improve presentation skills

8. **Required Responsibility for Student**
   - Lecture/Class attendance: 80% of lectures
   - Discussion and/or Seminar: 100%
   - Mid-term Test: complete all tests
   - Final Examination: complete

9. **Reading Materials**
   j) Nguyễn Anh Tuấn, Lê Thanh Hùng và Nguyễn Thanh Phương (2005). Giáo trình tiếng Anh chuyên ngành Nuôi trồng Thủy sản. Nhà xuất bản Nông nghiệp.
   b) Website of the World Aquaculture Society (www.was.org) – presentation of papers in various conference
   k) Scientific paper/article will be supplied during the course

10. **Grading System**
    - Homework Assignments: 15%
    - Seminar/Class presentation: 20%
    - Mid-term Exam: 15%
    - Final Exam: 50%

11. **Detail Description of Course**
    a) Natural feeding behavior of Tilapia
    - Grammar review: Participles
    - Explanation of important terms/words
    - Comprehensive reading and translating the text
    - Writing short notes and presentations
    - Supplementary reading article: Scientific names

b) Nutrient requirement of fish

- Grammar review: Gerunds
- Explanation of important terms
- Comprehensive reading and translating the text
- Group discusssion
- Supplementary reading article: Fish meal and fish oil utilization in aquafeeds

c) Osmoregulation and ion balance in fish

- Grammar review: Simple future tense
- Explanation of important terms
- Comprehensive reading and translating the text
- Writing short notes and presentations
- Supplementary reading article: Free selective

d) Propagation of Chinese major carps

- Grammar review: The present perfect tense
- Explanation of important terms
- Comprehensive reading and translating the text
- Group discusssion
- Supplementary reading article: Biology of natural propagation of finfish

e) Introduction to fish genetics

- Explanation of important terms
- Comprehensive reading and translating the text
- Presentation of free selected papers
- Supplementary reading article: Free selective

f) Shrimp diseases

- Explanation of important terms
- Comprehensive reading and translating the text
- Writing short notes and presentations
- Supplementary reading article: white spot syndrome virus in shrimp

g) Fish diseases

- Explanation of important terms
- Comprehensive reading and translating the text
- Presentation of free selected papers
- Supplementary reading article: Free selective

11) AQUA205 (COMM 1000): Public Speaking

1 **Title**:
AQUA205 (COMM 1000): Public Speaking

2 **Number of Credits:** 2

3 **Instructors**
Mr. Phan Huy Hung
A/Prof. Dr. Nguyen Thanh Phuong

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours x 10 weeks = 20 lecture hours
	Discussion/Seminar	1 lecture hour x 10 weeks = 10 lecture hours
	Private Study:	2 lecture hours x 15 weeks = 30 lecture hours

6 **Course Objectives**
This course aims to provide students with the principles in public speaking and guidances in preparing speeches for public speaking.

7 **General Course Contents**
- Why public speaking is important?
- Principles in public speaking
- Preparing and practicing speaking.
- Use of visual aids

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Mini Projects/Assignment: complete all
- Discussion and/or Seminar: complete all
- Mid-term test: required
- Final Examination: required

9 **Reading Materials** (theo bảng tiếng Việt)
a) Glencoe Professional Communication Series (2003). Public speaking: 10 ways to deliver your message with cofidence. McGrawHill Glencoe. 213p.

11 **Grading System**
- Homework Assignments: 15%
- Seminar: 15%
- Seminar/Class presentation: 20%
- Final Exam: 50%

12 **Detail Description of Course**

a) Your Role as a Public Speaker
- Public Speaking in Everyday Living
- The Basics of Oral Communication
- The Message Takes Center Stage

b) Choosing a Topic: Focusing Your Speech
- Selecting a Topic
- Selecting a Purpose

- Developing a Thesis Statement

c) Patterns of Organization
- Organizing an Informative Speech
- The Art of Persuasion
- Entertaining Speeches : Speaking at Special Occasions

d) Gathering Information
- Research Your Topic
- Effective Research
- Conducting an Interview

e) Composing Your Speech
- Creating a Custom-Made Outline
- Supporting Your Main Idea
- Adding Your Unique Style

f) Dazzling Your Audience
- Introductions and Attention Grabbers
- Memorable Conclusions
- Road Signs: Transitions in the Speech

g) Delivering Your Speech
- Projecting Your Voice
- Gestures, Movement, and Eye Contact
- Conveying a Professional Image
- Practice Makes Perfect

h) Using Visual Aids
- Visual Aids as Support
- Types of Visual Aids
- Incorporating Visual Aids in Your Speech

3.3.2 Các môn thuộc khối kiến thức cơ sở ngành

12) AQUA204 (FISH2010) Introduction to Fish Science

1 **Title**:
AQUA204 (FISH2010): Introduction to Fish Science

2 **Number of Credits:** 3

3 **Instructors**
A/Prof. Dr. Nguyen Thanh Phuong, Dr. Tran Ngoc Hai and Dr. Duong Nhut Long

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours x 15 weeks = 30 lecture hours
	Laboratory:	2 lecture hours x 15 weeks = 30 lecture hours
	Private Study:	1 lecture hours x 15 weeks = 15 lecture hours

5 **Prerequisites:**
None

6 **Course Objectives:**
This course aims to introduce the students with most basic concepts, definitions historical development of aquaculture and major aquaculture production systems that will make the students have ….. about their aquaculture career.

7 **General Course Contents**
The course will cover the following topics:
a) Most basic concepts and definitions of aquaculture
b) Historical development of aquaculture
c) Most basic principles of aquaculture systems
d) Field visit to fish/shrimp farms and hatcheries
e) Field trip reporting and discussing

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Field trip attendance: Requisite
- Mid-term test: Requisite
- Final Examination: Requisite

9 **Reading Materials:**
a) Landau, M. (1992). Introduction to aquaculture. John Willey & Sons, Inc.

11 **Grading System**
- Fieltrip report: 20 %
- Mid-term Exam: 20%
- Final Exam: 60%

12 **Detail Description of Course**
a) Concepts and definitions about aquaculture
- Aquaculture
- Capture fisheries
- Aquatic resource management

b) Historical development of aquaculture

- Starting point of aquaculture in the world and Viet Nam
- Aquaculture during the nineteenth and twentieth centuries in the world and Viet Nam
- Nghề nuôi trồng thủy sản những năm cuối thế kỷ 19 và đầu 20
- Recent aquaculture

c) **Fundemental factors of aquaculture**

- Water environment
- Water bodies for aquaculture
- Principle biology of cultured sepcies
- Common sepcies of culture

d) Production systems

- Pond culture
- Pen/cage culture
- Rice-fish culture
- Sea-base culture
- Marine cage culture
- Intenve culture in tanks/raceway.

e) Field trips

- Field trip to shrimp farms
- Field trip to catfish farms
- Field trip to fishery processing plans
- Field trip to shrimp/catfish hatcheries
- Reporting and discussion on field trip (by group)

13) AQUA206 (FISH5220): Water Science

1. Course Title

AQUA206 (FISH5220): Water Science

2. Credit Hours

3 lectures

3. Intructor

Prof. Dr. Claude E. Boyd
Assoc. Prof. Dr. Truong Quoc Phu & Dr. Vu Ngoc Ut

4. Prerequisites

Oganic chemistry or departmental approval

5. Course Content/Objectives

Objectives

To present general information on the properties of water, hydrology, climatology, basic water chemistry, and water quality to students in fisheries, aquaculture, and other areas of agriculture.

Outline of course contents

a) Physical Properties of Water
b) Hydrology
c) Dissolved Solids
d) Dissolved Oxygen and Redox Potential
e) Particulate Matter, Turbidity, and Color
f) pH, Carbon Dioxide, and Alkalinity
g) Total Hardness
h) Bacteria, Phytoplankton, and Water Quality
i) Oxygen Production and Demand
j) Nitrogen
k) Phosphorus
l) Sulfur
m) Micronutrients and Other Trace Elements
n) Water Pollution
o) Water Quality Regulations

6. Textbook

Boyd, C. E. 2000. Water Quality, An introduction. Kluwer Academic Publishers, Boston, Massachusetts, USA.

7. Grading and Evaluation Procedures

Performance requirements and evaluations
4, 1-hr Quizzes: 80%
Final examination: 20%

Grading system

The tests will be graded on a 0 to 100 point scale. Equal weight will be given to the tests and the final examination to obtain the average score for the class. Letter grades will be assigned by ranking using natural gaps in the array of scores as divisions between letter grades.

8. Statement Related to Policies on Unannounced Quizzes and Class Attendance and Participation

There will be no unannounced tests and dates for tests will be established at least 1 week in advance. Class attendance is expected, but no record of attendance will be maintained. Students may expect to be asked oral questions from time to time, but no record of this activity will be maintained.

Sudents with special needs because of handicaps or other reasons should make their needs known to the instructor in the first week of class.

14) AQUA301 (FISH 5320/6320): Limnology and Limnology Laboratory

1. **Course Title**
   AQUA301 (FISH 5320/6320): Limnology and Limnology Laboratory,

2. **Credit Hours**
   4 credit hours

3. **Intructor**
   Dr. Alan Wilson
   Dr. Vu Ngoc Ut & Assoc. Dr. Truong Quoc Phu

4. **Prerequisites**
   BIOL 1030/1037, CHEM 1040, FISH 2100, BIOL 3060, FISH 5220

5. **Course Content/Objectives**

6. **Objectives and student learning philosophy**
   The course objectives represent a variety of tasks and skills that I expect students to have developed andmmastered by the end of the course. Through participating in this course, you will:
   a) practice and develop your critical thinking skills (through in-class group discussions, presentations, and laboratory exercises)
   b) learn how to read and interpret the scientific literature, and
   c) broaden your understanding of freshwater ecosystems (through lectures and lab).
   My role in this course is to encourage and facilitate your learning and critical thinking about the ecology of freshwater ecosystems in a learning and fun-filled environment. I hope to provide you with a solid foundation of concepts and skills with which you can understand the complexity of freshwater ecosystems.

7. **Outline of course contents**
   a) Course introduction and overview, What is limnology?
   b) History of limnology, approaches for studying limnology
   c) Lake bathymetry and morphometry
   d) Origin of lakes; lake types
   e) Water as an environment
   f) Viscosity and Reynolds numbers
   g) Lake mixing, waves, currents
   h) Light in lakes
   i) Heat in lakes and stratification
   j) Seasonal mixing patterns
   k) Oxygen cycle
   l) Carbon cycle
   m) Phosphorus and nitrogen cycles; stoichiometry
   n) Single-celled and colonial organisms
   o) Aquatic invertebrates
   p) Aquatic vertebrates, macrophytes
   q) Population dynamics: phytoplankton
   r) Population dynamics: zooplankton
   s) Community ecology: competition
   t) Community ecology: predation
   u) Seasonal succession, trophic cascades, biomanipulation

v) Bottom-up regulation and energy flow
w) Eutrophication
x) Exotic species

8. **Limnology laboratory**

Laboratory requirements
Fieldwork is a common part of most labs. Students should be prepared for work in lakes and streams by wearing appropriate clothing and wading boots (or old tennis shoes). Sampling equipment and transportation to the sites will be provided. Full participation is essential in order to learn the methodological techniques used by limnologists. Short quizzes on the afternoon's lab may precede or follow each lab. Field and lab data will be compiled into formal lab reports (described below) and/or data presentations for select labs (see schedule).

Lab reports
All lab reports should be turned in at the beginning of the following lab. The purpose of the lab reports is to give you practice in writing concise, accurate scientific reports with original conclusions and applications.
Reference all sources of background information and methodological techniques.
Reports incorrectly formatted will not be graded and will receive a 0.

Report format (≤ 4 pages total, 12 pt. font, double-spaced, 1" margins)
- Student name
- Laboratory title
- Introduction – background information and description of lab objectives and hypotheses
- Methods – include photos and diagrams, if needed
- Results – include figures and/or tables to present data, if needed
- Literature cited

Laboratory topic
Lght, O2, tempeature
Field Pond mapping
Field/lab Pond bathymetry
Lab Chlorophyll analysis
Lab Phytoplankton identification
Lab Zooplankton identification
Field Electrofishing
Lmnological sampling

9. **Textbook**
a) Dodson, S. I. Introduction to Limnology. McGraw-Hill, 2004. Available at http://www.aubookstore.com/
b) Select chapters from Wetzel, R. G., and G. E. Likens. Limnological Analyses. Spring-Verlag, Berlin. 2000.

c) Welch, P. S. Limnological Methods. McGraw-Hill, New York. 1948, will be used for some laboratory exercises. These chapters are made available.
d) Articles from the peer-reviewed literature (see below) will be used in student-led classroom discussions to supplement the textbooks.
   - Brooks, J. L., and S. I. Dodson. 1965. Predation, body size, and composition of plankton. Science 150:28-35.
   - Carpenter, S. R., J. K. Kitchell, and J. R. Hodgson. 1985. Cascading trophic interactions and lake productivity. Bioscience 35:634-639.
   - Forbes, S. A. 1887. The lake as a microcosm. Bulletin of the Peoria Scientific Association:77-87.
   - Hutchinson, G. E. 1961. The paradox of the plankton. American Naturalist 95:137-145.
   - Kerr, R. A. 1989. Nyos, the killer lake, may be coming back. Science 244: 1541-1542.
   - Porter, K. G. 1977. The plant-animal interface in freshwater ecosystems. American Scientist 65:159-170.
   - Schindler, D. W. 1974. Eutrophication and recovery in experimental lakes: implications for lake management. Science 184: 897-899.
   - Strayer, D. L., V. T. Eviner, J. M. Jeschke, and M. L. Pace. 2006. Understanding the long-term effects of species invasions. Trends in Ecology & Evolution 21:645-651.

10. **Grading and Evaluation Procedures**

Grading
Course grades are based on each student's cumulative performance for the following assignments:

Activity	**Points**
Lecture - Attendance and participation	10
Lecture - Research articles	10
Lecture - Quizzes	10
Lecture - Presentation	10
Lecture - Midterm exams	20
Lecture - Final exam	20
Lab - Attendance and participation	10
Lab - Reports and Final	10
Total	100

Grading scale
A = 90-100
B = 80-89
C = 70-79
D = 60-69
F = 0-59

11. **Participation & Assignments expectations**:
The course grade will be based on participation in lecture and lab, research article

evaluations, quizzes, a presentation, lab reports, and midterm and final exams as described below:

Participation: Discussion is vital to an effective learning environment and participation grades will reflect student attendance and involvement during classroom and laboratory activities. In order to participate, you need to be at class on-time, prepared (i.e., perused readings), and with your cell phones off. One or two randomly chosen undergraduate students will also assist with leading discussions of the peer-reviewed literature scheduled five times throughout the semester – so be prepared with paper overview and questions for class.

Research Articles Reports: To familiarize you with the primary limnological literature, students will be expected to survey the literature from a predefined list of journal selections and concisely (≤ 1 page) scientifically describe one article from four different journals throughout the semester. Article reports should include an attached reprint, the article citation, description of why you chose paper, study objectives, methods, novel findings, and flaws. Reports not fitting these criteria will be given a 0. On each due date, one or two students may be randomly chosen to briefly (≤ 5 minutes) present their paper to the class.

Lecture Presentation: All students will be required to give a 10 minute lecture reviewing a topic of interest to them from the limnological literature. Brief 1 page outlines will be due mid-semester (see lecture calendar below) so that I can assist with presentation and paper (if applicable) development.

Laboratory Reports: The purpose of the lab reports is to give the students an opportunity to write concise and accurate scientific reports with original data and conclusions. Reports will be required for selected labs (see lab calendar below) and will be due the week following each lab.

Lecture and Lab Quizzes: During many class and lab periods, you will be given a short unannounced quiz. Classroom quizzes will focus on information learned in class and laboratory quizzes will focus on information learned in lab. Also, these quizzes may be given at the start, during, or end of a class or lab period. The focus of these assignments will be (1) to test your preparation for each class or lab period and (2) on answering questions or synthesizing material from previous lectures or labs. These assignments will test your understanding of class material, allow you to synthesize information from class lectures and lab activities, to extrapolate the information you have learned to new situations. At times, questions may require you to work collaboratively with other students and to report your answers to the class. Many of the quiz questions may be similar to those that will be on the midterm and final exams. Students who are absent from class and miss a quiz will be given a 0 for the quiz and that day's participation grade. Make-up quizzes will not be provided.

Lecture Midterm Exams: Two closed-book midterm exams will test your knowledge of basic facts and your understanding and synthesis of class concepts. The types of

questions on the exam will be similar to the questions that are asked during quizzes. The textbook and primary literature readings reinforce the lecture material and will be used to develop exam questions. Exam questions may include true/false, multiple choice, short answer, and essays. Students who are absent from class and miss a test will be given a 0 for the test. Make-up tests will not be provided.

Lecture and Lab Final Exams: The closed-book final exams (classroom and laboratory) will be similar to the midterm exams and will be comprehensive. Make-up finals will not be provided.

12. **Classroom attendance & behavior**

To receive participation points, it is imperative to attend class and engage in classroom discussions and in-class group projects. If you choose not to attend class on any day, then you accept the responsibility to learn the material on your own. If you have a question during the class period, please do not hesitate to ask. In fact, other students probably have the same question. It is important to be on time for class since the first 5 minutes of each lecture will establish the direction for that day's session. Therefore, if you come in late, certain things may not make sense and you will miss important announcements. Throughout the semester, please be courteous to all of your fellow students and to me so we can create a positive learning environment. All cell phones should be turned off before entering the classroom and should not be used during class.

13. **Feedback & Evaluation**

This course is for you to learn important fundamental concepts and ideas on which to build your understanding of freshwater ecosystems. I will do my best to create a positive learning environment. However, learning styles differ among students, so I may do some things that are not optimal for you. If this occurs, you can let me know through email or written comments turned in at the end of the class period, during office hours, or via email. Because I need to keep the interest of all students in mind, I cannot promise that I will change the course. However, I do promise to listen and consider your suggestions. Moreover, course evaluations will be completed by students at the middle and end of the semester so that course changes can be made to enhance the earning experience for this class and future classes. Finally, students will be given an opportunity at the end of ost lectures to ask questions about concepts not fully understood via one-minute papers. Some of these questions may be used on quizzes and/or exams.

14. **Course Changes**

Although I expect to cover all the topics described in the syllabus, course changes will likely occur – especially based on feedback from the students. Consequently, I reserve the right to modify the course to enhance the learning experience where I deem appropriate. Course changes will be described verbally during class and/or in riting via email and/or handouts.

15) AQUA208 (FISH5380): Phân loại học đại cương

1 **Title**:
AQUA208 (FISH5380):General Ichthyology

2 **Number of Credits:** 4

3 **Instructors**
Dr. Tran Dac Dinh and Mr. Nguyen Van Thuong

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 15 weeks = 45 lecture hours
	Laboratory:	2 lecture hours * 15 weeks = 30 lecture hours
	Private Study:	1 lecture hours * 15 weeks = 15 lecture hours

5 **Prerequisites:**
Introduction to Fish science and Principles of Biology

6 **Course Objectives:**
This course aims to supply the students with:
a) Most basic knowledge about the ichthyology
b) Structure and form of fish
c) Classification of fish and shrimp

7 **General Course Contents**
f) Introduction to ichthyology
g) Structure and form of fish
h) Classification of fish
i) Classification of shrimp

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Lab. Attendance: Requisite
- Mid-term Test: Requisite
- Final Examination: Requisite

9 **Reading Materials:**
a) Peter, B. M., 2004, *Fishes: An introduction to ichthyology*. Prentice Hall, 726p.
b) Joseph, S. N., 1994, *Fishes of the world*. John Wiley & Sons, Inc., 600p.
c) Barnes, R. S. K.; Calow, O. and Olive, P. J. W., 2000, *The invertebrates: a new synthesis*. Blackwell Science, 488p.
d) Tetsuji, N., 1993 *Fishes of Japan with pictorial keys to the species*. Tokai University Press, 1474 p.

11 **Grading System**
- Lab. Exam: 20 %
- Mid-term Exam: 20%
- Final Exam: 60%

12 **Detail Description of Course**
a) **Introduction**
- Diversity of modern fishes
- History of ichthyology
- Fish classification

b) Form and Movement
- External anatomy
- Body shape
- Scales
- Fins
- Other structures
- Skeletal system
- Muscular system
- Locomotion

b) **Respiration**
- Gills
- Air-breathing fishes
- Fish oxygen requirements

c) **Blood and circulation**
- Circulation system

d) **Reproduction**
- Reproductive anatomy
- Breeding behavior
- Development
- Sex change in fish

e) **Sensory perception**
- Olfaction
- Taste
- Acousticolateralis system
- Lateral line
- Vision

f) **Fishes**
- Introduction
- Sharks and rays
- Bony fishes
- Eels and herrings
- Catfishes
- Salmon and cods
- Other fishes

g) Shrimps
- Introduction
- External anatomy of shrimp
- Penaeidea
- Caridea
- Other shrimps

16) AQUA209: Aquatic animal physiology

1 **Title**:
AQUA209: Aquatic animal physiology

2 **Number of Credits:** 4

3 **Instructor:**
A/Prof. Dr. Mark Baley
Dr. Do Thi Thanh Huong

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Laboratory:	5 lecture hours * 12 weeks = 60 lecture hours
	Private Study:	2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:** Maximum 2 courses (TN 023; TS 101)

6 **Course Objectives**
This course aims to supply the student with:
a) General principles of fish and crustacean physiology
b) Functions of organs and glands in the fish and crustacea
c) Response of physiology to external changes
d) Applied Physiology

7 **General Course Contents**
a) Hematology
b) Respiration
c) Digestion
d) Metabolism
e) Endocrine system
f) Osmoregulation
g) Reproduction
h) Crusteacean molting
i) And 10 subjects for projects in the lab

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Lab. Attendance: 100%
- Mini Projects/Assignment: 100%
- Mid-term Test: 100%
- Final Examination: 100%

9 **Reading Materials**
a) David H. E. 1993. The Physiology of Fishes. Marine Science Series. Printed in the United States of America
b) Lockwood, A. P. M. 1967. Aspects of the Physiology of Crustacea. Printed in Great Britain
c) Smith L. S. (1982). Introduction to Fish Physiology. T. F. H. Publication.
d) 4. Perry, S. F. and Tufts B. L. (Eds). 1998. Fish Respiration. In Fish Physiology volume 17

11 **Grading System**

- Lab. Exam: 30%
- Mid-term Test: 20%
- Final Exam: 50%

12 **Detail Description of Course**

Hematology

a) Intracellular and extracellular milieu and blood
- Intracellular and extracellular milieu
- General Principles of blood
- Functions of blood
- Quantity of fish blood

b) Physical characterization and composition of blood
- Composition of blood
- Physical characterization of blood

c) Blood cells
- Erythrocyte
- Leucocyte
- Thrombocyte

Respiration

a) Respiratory environment and general principles
- Oxygen and Carbon Dioxide in the water
- General principles

b) Respiratory pump
- Functional Anatomy
- Oxygen and carbon dioxide transport
- Characteristics of a Countercurrent exchange system
- Respiratory frequency

c) Responses of the respiratory system to external changes
- Changes with increased temperature
- Changes with hypoxia
- Increased activities
- Effects of chemicals in the water

d) Air-breathing organs
- Intestine
- Skin
- Gill organs
- Air bladder

Digestion

a) Digestion
- Anatomy of the digestive system
- Digestive secretions

b) Absorption
- Lymphatic system
- Blood system
- Stomach surface

- Intestine surface
- Amino acid absorption
- Lipid absorption
- Glucid absorption

c) Response of the digestion to the external and internal changes
- Quantity of food
- Quatity of food
- Water temperature
- Age

Osmoregulation

a) Kidney function and osmoregulation
- Freshwater Fish
- Marine Fish

b) Crustacean osmoregulation
- Osmo and ion regulation in marine crustacea
- Osmoregulation in euryhaline crustacea

Metabolism

a) Protein metabolism
b) Lipid metabolism
c) Carbohydrate metabolism
d) Water metabolism
e) Mineral metabolism
f) Vitamin metabolism

Endocrine system

a) General concept
b) Hormon
c) Fish Pituitary gland
d) Thyroid gland
e) Kidney gland
f) Ovary gland

Reproduction

a) General Principles of Maturation
- Body maruration
- Ovary maturation
- Frequency maturation

b) Oocyte development
c) Chemical change of oocyte in different stages of ovary
d) Ovulating mechanism and degenerating ovary
- Ovulating mechanism
- Degenerating ovary

e) Hatching mechanism
f) Response of reproductive physiology to external changes

- Nutrition
- Temperature
- Water flow
- Others factors

Molting

a) General principles
b) Exoskeletone structure
c) Molting stages
d) New exoskeletone development
e) Molting cycle

Lab works

a) Hematological method
b) Oxyxen consumption and deficit
c) Eurythrocyte and leucocyte counting
d) Acute effects of chemicals on aquatic animals
e) Tolerance of temperature and salinities on aquatic animals
f) Activities of air-breathing organs of fishes.
g) Osmoregulation of fish
h) Osmoregulation of crustacean
i) The effects of chemicals (or pesticide) on fish osmoregulation
j) The effects of chemicals (or pesticide) on crustacean osmoregulation

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17) AQUA210 (FISH-7640/7641): Dinh dưỡng động vật thủy sản

1. **Course Title**
   AQUA210 (FISH7640/7641): Aquatic animal nutrition

2. **Credit Hours**
   3 (two lectures and 1 laboratory per week)

3. **Intructor**
   A/Prof. Dr. D. Allen Davis
   Dr. Tran thi Thanh Hien and A/Prof. Dr. Nguyen Anh Tuan

4. **Prerequisites**
   Fund. of Chemistry I and II and Analytical Chemistry

5. **Course Content/Objectives**

Objectives

This class will emphasis the fundamental and applied aspects of aquatic animal nutrition. Emphasis will be placed on: factor effecting feed utilization, nutrient ingestion/digestion, nutrient metabolism as it relates to maintenance, growth, and reproduction. Nutritional requirements, feed formulation and feeding practices will be discussed for a variety of marine and freshwater species of commercial interest. Class lectures and test times are subject to change.

Tentative course outline

Introduction

a) Definitions
b) Deficiency symptoms
c) Feeding behavior and fish culture
d) Concept of feeding fish
e) Biotic and abiotic factors and there effects on feed utilization

Introduction to enzymes

Digestive systems

a) General morphology
b) Digestive enzymes
c) Nutrient absorption
d) Factors affecting digestibility
e) Measures of digestibility

Nutrients

Energy

- Energy requirements and budgets
- Measures of dietary energy

Carbohydrates

- Structure
- Glycolysis/gluconeogenesis

Protein

- Structure
- Metabolism

- A.A. Requirements
- Protein sources

Lipids
- Nomenclature
- E.F.A Dietary Requirements
- B-oxidation

Vitamins
- Classification
- Absorption/metabolism
- Fat soluble vitamins
- Water soluble vitamins

Minerals
- Dietary requirements
- Interactions with other nutrients

Non-nutrient diet components
- Feed evaluation
- Ration formulation

Feed processing
Feed management/Open

Lab works

a) Ingredient and feed analytical techniques for moisture, protein, lipd, carbohyrate and fiber.
b) Feed formulation
c) Feed processing
d) Feed quality evaluation

15. **Textbook**

Fish

1. Halver, J. E and R. W. Hardy 2002. Fish Nutrition Third Edition. Academic Press, New York, NY.
2. Cowey, C. B., A. M. Mackie and J. G. Bell. Editors. 1985. Nutrition and Feeding in Fish. Academic Press Inc. Orlando, Florida.
3. Halver, J. E. The vitamin required for cultured salmonids. Comparative Biochemistry and Physiology. 73B:43-50.
4. Kaushik, S. J. 1986. Environmental effects on feed utilization. Fish Physiology and Biochemistry 2:131-140.
5. Ketola, G. H. 1982. Amino acid nutrition of fishes: requirements and supplementation of diets. Comparative Biochemistry and Physiology. 73B:17-24.
6. Luquet, P. and T. Watanabe. 1986. Interaction "nutrition-reproduction" in fish. Fish Physiology and Biochemistry 2:121-129.
7. National Research Council. 1977. Nutrient Requirements of Warmwater Fishes. National Academy of Sciences, Washington, DC.
8. National Research Council. 1981. Nutrient Requirements of Coldwater Fishes. National Academy Press, Washington, DC.

9. National Research Council. 1983. Nutrient Requirements of Warmwater Fishes and Shellfishes. National Academy Press, Washington, DC.
10. Pfeffer, E. 1982. Utilization of dietary protein by salmonid fish. Comparative Biochemistry and Physiology. 73B:51-57.
11. Robinson, E, H. and R. P. Wilson. 1985. Nutrition and feeding. Pages 323-404 in C. S. Tucker, editor. Channel Catfish Culture. Elsevier Scientific Publishers B. V., Amsterdam.
12. Webster C.D. and C.E. Lim. 2002. Nutrient requirements and feeding of finfish for aquaculture. CAB International, New York, NY

Crustacea

1. Bliss, D. E. Editor-in-Chief. 1983. The Biology of the Crustacea. Internal Anatomy and Physiological Regulation. Academic Press. New York, NY.
2. Conkilin, D. E. Nutrition. In The Biology and Management of Lobsters, Vol I. Academic Press Inc.
3. Kanazawa, A. 1984. Nutrition of penaeid prawns and shrimp. Proceedings of the first international conference of penaeid prawns/shrimp. Iloilo City, Philippines pp122-130.
4. New, M. E. 1976. A review of dietary studies with shrimp and prawns. Aquaculture. 9:101-144.
5. Pruder, C. G., C. Landgon and D. Conklin. Editors. Proceedings of the Second International Conference on Aquaculture Nutrition: Biochemical and Physiological Approaches to Shellfish Nutrition. World Mariculture Society. Special Publication No. 2. Louisiana State University, Baton Rouge, Louisiana.

Microencapsulation

a) Jones, D. A., D. L. Holland and S. Jabborie. 1984. Current status of microencapsulated diets for aquaculture. Applied Biochemistry and Biotechnology. 10:275-288.

Digestion

a) Vonk, H. J. and J. R. H. Western. 1984. Comparative biochemistry and physiology of enzymatic digestion. Academic Press, New York, Ney York. 495pp.

16. **Grading and Evaluation Procedures**

- Exams (3) 20% each
- Participation 15%
- Final 25%

Grading scale

- A (>90%)
- B (<90%, > 80%)
- C (<80%)

18) AQUA203 (BIOL3200): Microbiology

1 **Title**:
AQUA203 (BIOL3200): Microbiology

2 **Number of Credits:** 3

3 **Instructor**
Dr. Dang Thi Hoang Oanh

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Laboratory:	3 lecture hours * 10 weeks = 30 lecture hours
	Private Study:	2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:** Principals of Biology and Water Sciences

6 **Course Objectives**
This course aims to supply the student with:
a) History, achievements and application of microbiology
b) Structures, functions and activities of microbial cells
c) Interaction of microorganisms and environmental factors
d) Roles of microorganisms in aquatic environments

7 **General Course Contents**
a) History of microbiology and roles of microorganisms in nature and human life
b) Prokaryotes
c) Eukaryotes
d) Virus
e) Microbial nutrition and growth
f) Microbial genetics
g) Aquatic microorganisms and pathogens of aquatic organisms

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Lab. Attendance: 100%

9 **Reading Materials**
a) Kenneth Todar, 2003. Major groups of prokaryotes. Department of Bacteriology. University of Wisconsin-Madison.
b) Madigan, M.T., Martinko, J.M. and Parker, J., 2002. Biology of Microorganisms. Tenth edition, Prenhall.
c) Kenneth Todar, 2001. Nutrient and growth of bacteria. Department of Bacteriology. University of Wisconsin-Madison.
d) Ford. T. E., 1994. Aquatic Microbiology.

11 **Grading System**
- Lab. Exam: 30 %
- Final Exam: 70%

12 **Detail Description of Course**
Introduction to microbiology
a) Microorganisms and microbiology
b) Historical roots of microbiology
c) Role of microorganisms in nature and to human life
Prokaryotic microorganisms

f) Eubacteria
a) Bacteria
b) Actinobacteria
c) Cyanobacteria
d) Mycoplasmas, Chlamydias and Rickettsias
e) Archaebacteria

Eukaryotic microorganisms
a) Fungi
b) Slime molds
c) Protozoa
d) Algae

Virus
a) General characteristics of virus
b) Viral structures
c) General features of virus reproduction

Microbial nutrition and growth
a) Microbial nutrition
- Carbon and nitrogen
- Other macronutrients
- Micronutrients
- Culture media
b) Microbial growth
- Growth cycle of microbial poppulations
- Measurement of microbial growth
- Factors effect microbial growth

Microbial genetics
a) General features of microbial genetics
b) Viral genetics
c) Genetics in Prokaryotic microorganisms
d) Genetics in Eukaryotic microorganisms
e) Mutations and mutants in microorganisms

Aquatic microorganisms and pathogens of aquatic organisms
a) Distribution of microorganisms in aquatic environments
b) Role of microorganisms in the aquatic environments
c) Microbial as pathogens of aquatic organisms

3.2.2 Các môn thuộc khối kiến thức chuyên ngành

19) AQUA212 (FISH5210/6210): Nguyên lý nuôi trồng thủy sản

17. **Course Title**
AQUA212 (FISH 5210/6210): Principles of Aquaculture

18. **Credit Hours**
3 lecture hours

19. **Instructors**
A/Prof. Dr. Bill Daniels
A/Prof. Dr. Nguyen Thanh Phuong

20. **Course Content/Objectives**

Objectives

a) Learn the status and future of aquaculture in US and Viet Nam and around the world.
b) Learn the basic principles of aquaculture and understand how they influence the carrying capacity, growth and yield of cultured plants and animals.
c) Apply the principles to selected species to understand how they influence production methods
d) Learn how major fish and crustacean culture species are farmed

Outline of Course

Present the principles underlying aquatic productivity and levels of management as demonstrated by present practices of aquaculture around the world.

a) The status of aquaculture world-wide and its role in seafood production; definition of terms used in principles of aquaculture.
b) Factor that control carrying capacity in aquaculture
c) Factor that influence the growth of aquatic organisms in aquaculture
d) Factor that influence yield in aquaculture
e) Role of economic in aquaculture; levels of aquaculture; integrated aquaculture
f) Use of cages to farms fish; enclosed, water reuse systems
g) Farming methods for major aquaculture species
h) Class presentation

21. **Textbook**

Assessing Class Notes: Class notes can be accesses via the FAA Department website (http://www.ag.auburn.edu/fish/) by clinking on "Current Student' tab and then "Class Files" under "Student Resources" or (https://moodles.acesag.auburn.edu:44/) and then clicking on Principles of Aquaculture". Notes: These may change during the course of the semester; so, make sure you have the latest version.

22. **Class Assignment**

All students are required to submit a 6- to 7-pages written paper on a selected aquatic species. Sources for the paper will include internet sites, e-journals and publications. The paper must follow the format as outlined in the hand-out and include proper citation

for all internet sites and papers.

23. **Grading and Evaluation**

Grading system

A = 90- 100
B = 80-89
C = 70-79
D = 60-69
F = 0-59

Performance requirement and evaluation for students

Participation point:	5%
3, 1-hr. exam (20% each):	60%
Final examination:	20%
Class assignment:	15%
	100%

Examinations

Examination will consist of essay and short answer questions based on the material covered in the lecture and homework assignment.

24. **Justification**

None

20) AQUA302 (FISH5250): Aquaculture Production

1. **Course Title**
   AQUA302 (FISH5250): Aquaculture Production

2. **Credit Hours**
   4 lecture hours

3. **Instructors**
   A/Prof. Dr. Bill Daniels
   Dr. Duong Nhut Long and Dr. Lam My Lan

4. **Course Content/Objectives**

5. **Objectives**
   a) To introduce students principle techniques of aquaculture
   b) To descript farming techniques for major species (catfish, carps, tilapia, prawn,…) based on different production systems (ponds, cages, enclosure,…)

6. **Outline of Course**
   a) Evaluating aquaculture potential: is aquaculture a good option?
   b) Pond management
   c) Fertilizer
   d) Water quality management
   e) Feeds and feeding
   f) Aquatic weed management
   g) Effluence management
   h) Fish transportation
   i) Harvesting
   j) Aquaculture production species
      - Channel catfish: fry – market
      - *Pangasius* catfish: fry – market
      - Freshwater prawn
      - Crayfish
      - Tilapia
      - Carps
      - Snakehead
      - Climbing perch
   k) Aquaculture production systems
      - Cages
      - Raceways
      - Ponds
      - Rice fields

7. **Textbook**
   a) Lacas, JS. and P.C. Southgate (Eds) (2003). Aquaculture: Farming aquatic animals and plants. Fishing News Books.
   b) Egna, H.S. and C.E. Boyd (1997). Dynamics of pond aquaculture. CRC Press.

8. **Class Assignment**
   All students are required to submit a 6- to 7-pages written paper on a selected aquatic

species. Sources for the paper will include internet sites, e-journals and publications. The paper must follow the format as outlined in the hand-out and include proper citation for all internet sites and papers.

9. **Grading and Evaluation**

Grading system

A = 90- 100
B = 80-89
C = 70-79
D = 60-69
F = 0-59

Performance requirement and evaluation for students

Participation point:	5%
2, 1-hr. exam (20% each):	40%
Final examination:	40%
Class assignment:	15%
	100%

10. **Justification**

None

21) AQUA303 (FISH 6240): Fish Hatchery Management

1. **Course Title**
   AQUA303 (FISH 6240): Fish Hatchery Management

2. **Credit Hours**
   4 (2 lecures and 8 lab)

3. **Intructor**
   Assoc. Prof. Dr. Ronald P. Phelps
   Dr. Bui Minh Tam and Dr. Lam My Lan

4. **Prerequisites**
   FISH 6210: Principles of Aquaculture

5. **Course Content/Objectives**

6. **Objectives**
   To introduce and apply general procedures and considerations for the production of fish seed. Emphasis is given to understanding the basic hatchery techniques and the settings in which they are appropriate.

7. **Lecture Topic**
   a) Introduction, Goals, Planning
   b) Facilities required, Water needs
   c) Types of reproduction, Gonadal development
   d) Broodstock management
   e) Artificial spawning
   f) Sex determination and control techniques
   g) Egg characteristics, incubation and hatching
   h) Intensive larval rearing
   i) Extensive larval rearing
   j) Harvesting
   k) Distribution
   l) Production of coolwater fishes
   m) Production of warmwater sport fishes
   n) Production of commercial species for aquaculture
   o) Production of marine species

   Laboratory Topic
   a) Production plans
   b) Zooplankton collection and identification
   c) Research projects
   d) Hormone preparation and injection techniques
   e) Animal damage control
   f) Nursery pond preparation, insect control
   g) Fish handling and transport
   h) Field trip to fish hatchery
   i) Paddlefish reproduction
   j) Goldfish reproduction
   k) Fry handling and stocking

l) Golden shiner reproduction
m) Striped bass reproduction
n) Largemouth bass reproduction
o) Chinese carp reproduction

8. **Textbook**

a) Fish Hatchery Management , R.G. Piper edit., 1982, US Fish and Wildlife Service, Washington, D.C.
b) Culture of Nonsalmonid Freshwater Fishes. R.R. Stickney edit., 1986, CRC Press, Boca Raton, FL.

9. **Grading and Evaluation Procedures**

Course Requirements

A project related to hatchery management will be written and presented orally. A laboratory notebook will be kept and evaluated. Two exams and a final will be given.

Grading system

The class grade will be based on the following weighing:

Exam I	20%
Exam II	20%
Final exam	20%
Class notebook	20%
Class project	20%

Letter grades will be give based on the following scale

A	90-100
B	80-89
C	70-79
D	60-69
F	<60

10. **Unannounced exams, class attendance and participation policy**.

There will be no unannounced exams. Dates for exams will be established at least one week in advance. All work turned is late is -5 points/day late. Lecture attendance is expected but no records of attendance will be kept. Students will be expected to attend all laboratory activities and no make-up labs will be given. Students will be asked oral questions during class but replies will not be graded. Students with special needs because of handicap or other reasons should make their needs known to the instructor in the first week of class.

22) AQUA304 (FISH 5410/6410): Introduction to Fish Health and Clinical Fish Disease Diagnosis

1. **Course Title**
   AQUA304 (FISH 5410/6410): Introduction to Fish Health and Clinical Fish Disease Diagnosis

2. **Credit Hours**
   2 lecture hours

3. **Intructors**
   Dr. Jeff Terhune
   Dr. Dang Thi Hoang Oanh

4. **Course Content/Objectives**

5. **Objectives**
   The objective of this class is to introduce students to common infectious and non-infectious diseases that affect fish. Topics will include principles of disease management, treatments and calculation procedures, water quality and disease in cultured fish, nutrition and disease, recognition of diseases. At the end of the course, students will be able to:
   a) understand interactions between the host, the environment, and pathogens and disease development.
   b) collect proper fish samples for submission to a diagnostic laboratory.
   c) Implement methods of prevention and treatments for specific diseases.
   d) understand development of diseases from non-infectious sources.
   e) recognize specific clinical signs associated with common infectious disease sources.

6. **Outline of Course**
   a) Introduction to course
   b) Fish Anatomy and Physiology
   c) Concepts of fish health management
   d) Management and prevention of disease
   e) Recognizing diseases/clinical signs
   f) Pathological changes related to disease
   g) Treatments and vaccines
   h) Treatments and vaccines
   i) Non-infectious diseases of fish
   j) Non-infectious diseases of fish
   k) Viral Diseases
   l) Fungal diseases of fish
   m) Bacterial diseases of fish
   n) Bacterial diseases of fish
   o) Introduction to the parasites
   p) Parasitic diseases of fish
   q) Parasitic diseases of fish
   r) Marine/tropical fish diseases
   s) Marine/tropical fish diseases

7. **Textbook**

None required. Handouts will be given from the instructor and on-line.
Recommended texts:

- Health Maintenance and Principal Microbial Diseases of Cultured Fishes. J. A. Plumb.
- Fish Disease: Diagnosis and Treatment. E. J. Noga

8. **Laboratory topics**

There is no laboratory for this course but field trip opportunities will be offered.

9. **Grading and Evaluation**

Course requirements

- Students should attend class and all exams.
- Arrangements should be made prior to exam date if student will be absent.
- There will be 10 unannounced ("pop") quizzes; the two lowest will be dropped

Note: Students with special needs because of handicap or other reasons should make their needs known to the instructor in the first week of class.

Performance requirements and evaluations for students:

Exam 1	25%
Exam 2	25%
Pop Quizzes	15%
Final Exam	35%
	100%

90-100 = A
80-89 = B
70-79 = C
60-69 = D
<59 = F

10. **Justification**

This course will be an introduction to infectious and non-infectious diseases of fish and shellfish. It will be an upper level undergraduate course and graduate course. This will be the only disease course available for undergraduate students. The course will serve Graduate students as an introduction to diseases and a prerequisite to other disease courses in the Fisheries department. It will also function as an overview for students having a general interest in fish diseases. The lectures will consist of descriptions of diseases, treatment regimes, clinical signs of disease, and management practices. It will also introduce students to general definitions used in the other fish health and related courses.

23) AQUA305 (FISH 5410/6410): Fish Diseases

1. **Course Title**
   AQUA305 (FISH5410/6410): Fish Diseases

2. **Credit Hours**
   2 lecture hours

3. **Instructors**
   Dr. Yolanda J. Brady
   Dr. Tu Thanh Dung and Dr. Pham Minh Duc

4. **Course Content/Objectives**

5. **Objectives**
   To provide information and diagnostic techniques for viral, bacterial, fungal and parasitic diseases of fishes of the world with an emphasis on those of North America. Lectures wil cover etiological agents, geographical range, species susceptibility, clinical signs, clinical pathology, epidemiology, control and management of infectious diseases and parasites of and cold water freshwater finfish.

6. **Outline of Course**
   a) Course Introduction
   b) Parasites
   c) Parasites
   d) Parasites
   e) Parasites/Fungi
   f) Water quality
   g) Disease identification
   h) Bacterial diseases
   i) Bacterial diseases
   j) Bacteriology
   k) Virology
   l) Virology
   m) Virology
   n) Student presentations

7. **Laboratory topics**
   a) Introduction to Laboratory procedures
   b) Parasites
   c) Water quality and Treatments
   d) Introduction to bacterial and Identification methods
   e) Rapid biochemical ID
   f) Systems API strips
   g) Enterotube
   h) VITEK system
   i) API 20E inoculation and read API 20E results
   j) Introduction to molecular methods
   k) ELISA: direct and indirect, polymerase Chain Reaction
   l) Principles of Cell Culture
   m) Introduction to Virology

n) Cell Culture
o) Lab review

8. **Textbook**

a) Plumb, J. A. 1999. Health Maintenance and Principal Microbial Diseases of Cultured Fishes. Iowa State University, Press Ames, Iowa
b) Hoffman, G. L. 1999. Parasites of North American Freshwater Fishes. Second ed. Comstock Publishing, Ichaca, NY.
c) Lom, J. and I. Dykova. 1992. Protozoan Parasites of Fishes. Developments in Aquaculture and Fisheries Science, 26. Elsevier. Amsterdam.
d) Woo, P. T. K. 1995. Fish Diseases and Disorders Vol. 1. Protozoan and Metazoan Infections. CAB International, Wallingford, U. K.

9. **Grading and Evaluation**

Students are expected to attend class, exams, and participate in all laboratory exercises. The instructor should be notified in advance of known absence. Students with special needs because of handicap or other reasons should make their needs known to the instructor in the first week of class.

Grading System:

Exam 1	15%
Exam 2	15 %
Exam 3	15%
Lab exam 1	10%
Lab exam 2	10%
Lab. Exam 3	10%
Presentation	10%
Final exam	15%
	100%

Grading Scale

92 - 100 = A
81 - 91 = B
70 - 80 = C
60 - 69 = D
< 59 = F

10. **Justification**

Microbial and parasitic diseases of fish cause millions of dollars of losses in wild and cultured fish populations. Students will be trained in diagnostic techniques for identification of microbial fish pathogens and parasites including identification, life cycles and treatment of cultured fishes and wild fish populations.

24) AQUA306: Crustacean diseases

1 **Title**:
AQUA306: Crustacean Diseases

2 **Number of Credits:** 3

3 **Instructors**
Dr. Dang Thi Hoang Oang and Ms. Tran Thi Tuyet Hoa

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Laboratory:	3 lecture hours * 10 weeks = 30 lecture hours
	Private Study:	2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:**
Microbiology and introduction to Fish Health and Clinical Fish Disease Diagnosis

6 **Course Objectives**
This course aims to supply the student with:
a) basic knowledge about causative agents in crustaceans
b) information on common diseases in crustaceans
c) methods for detection and diagnosis of diseases in crustacean
d) general knowledge on health management in crustacean farming

7 **General Course Contents**
a) Common diseases in crustaceans
b) Virus diseases
c) Bacterial diseases
d) Fungal and protozoan parasitic disease
e) Diseases with unknown reasons
f) Detection and diagnosis of diseases in crustaceans
g) Disease prevention, treatment and management

8 **Required Responsibility for Student**
- Student must attend 80% of lecture hours
- Student must attend 100% practical hours in the laboratory
- Student must attend half course exam and final exam

9 **Reading Materials**
a) Graindorge V. A. and T. W. Flegel (1999). Diagnosis of shrimp diseases with emphasis on the black tiger shrimp. FAO & Multimedia Asia Co., Ltd., Bangkok, Thailand.
b) Lightner, D. V. (1996). A Handbook of shrimp Pathology and Diagnostic Procedures for Deseases of Culutred Penaeid Shrimp.
c) FAO Asia Diagnostic guide for aquatic animal disease. Fisheries technical paper 402/2.
d) Chanratchakool, P., J. F. Turnbull, S. Funge-Smith and C. Limsuwan (1995). Health management in shrimp ponds. 2nd edition. Aquatic Animal Health Research Institute. Bangkok Thailand.

11 **Grading System**
- Lab. Exam: 30%
- Final Exam: 70%

12 **Detail Description of Course**
Common diseases in crustacean

a) Viral diseases
b) Bacterial diseases
c) Fungus, protozoan parasites and fouling diseases
d) Environmental and nutritional diseases
e) Diseases by unknown reasons

Detection and diagnosis of diseases in crustacean

a) Detection of diseases

- Observation from the pond sites
- Detection of disease base on information on production
- Detection of disease base on information on environmental and farm management

b)Diagnosis of diseases

- Gross observation
- Fresh smears
- Isolation and identification of bacteria
- Isolation and identification of fungus
- Histology
- Immunological techniques
- Molecular techniques
- Electron microscopy
- Bioassay

Disease prevention, treatment and management

a) Specific pathogen free (SPF) and specific pathogen resistance (SPR)
- SPF
- SPR

b) Antibiotics, probiotics and immunostimulants
- Antibiotics
- Probiotics
- Immunostimulants

c) Health management in crustacean farming
- Farm management
- Pond preparation
- Water management
- Screening of important pathogens
- Feeding and monitor growth
- Control of diseases

25) AQUA315 (FISH5630/6630): Facilities for Fisheries and Aquaculture

1. **Course Title**
   AQUA315 (FISH5630/6630): Facilities for Fisheries and Aquaculture

2. **Credit Hours**
   3 (two lectures and 1 laboratory per week)

3. **Intructor**
   Prof. Dr. David B. Rouse
   Dr. Nguyen Van Hoa

4. **Prerequisites**
   Pre-requisites: Junior standing

5. **Course Content/Objectives**

6. **Objectives**
   The objective of this course is to provide the opportunity for students to become knowledgeable about technical procedures and information sources on design, construction and use of sport and food fish hatcheries and culture facilities.

7. The course will be taught by a team of faculty, staff and practicing professionals with special experiences and skills in the topics assigned to them. Laboratory sessions will focus on demonstrations, observations and information rather than skill building. Field trips will be taken to see various facilities.

   Tentative course outline is as follows:

   f) Introduction
   g) Watersheds and topography
   h) Watersheds and topography
   i) Soil quality and water sources
   j) Soil quality and water sources
   k) Site Selection and Feasibility
   l) Site Selection and Feasibility
   m) Design specifications & pond construction
   n) Harvesting systems
   o) Cages and net pens - freshwater systems
   p) Cages and net pens - marine systems
   q) Raceways - single/multi-pass
   r) Raceways
   s) Re-circulation systems components and overview
   t) Air lift pumps
   u) Re-circulation systems
   v) Hatchery facilities -shrimp
   w) Hatchery facilities - marine fish
   x) Hatchery facilities - freshwater fish
   y) Live feed systems
   z) Fluid mechanics and pumps
   aa) Piping and pump selection
   bb) Electrical systems and sizing
   cc) Pump and aeration maintenance

dd) Heavy equipment maintenance
ee) Contracting

8. **Textbook**

Boyd, C. E. 2000. Water Quality, An introduction. Kluwer Academic Publishers, Boston, Massachusetts, USA.

9. **Grading and Evaluation Procedures**

Examinations and grading

- Homework, field and laboratory exercises = 20%
- Three exams = 60%
- Final examination = 10%
- Attendance, participation & professionalism = 10%

10. **Grading scale**

A $\geq$ 90
B = 80-89.9
C = 70-79.9
D = 60-69.9
F < 60

11. **Class policies**

Students are expected to be present for every class session except for documented emergencies and excused absences. Professional behavior is expected at all time during the class, laboratory and field trips. Any student not maintaining a professional demeanor will receive one oral warning for the first problem, if there is another problem the student will lose one letter grade, if there are any additional problems the student will be given a failing grade.

26) AQUA307 (FISH7270): Crustacean and Molluscan Aquaculture

1. **Course Title**
   AQUA307 (FISH7270): Crustacean and Molluscan Aquaculture

2. **Credit Hours**
   3 lectures

3. **Intructor**
   Prof. Dr. David Rouse
   Dr. Tran Ngoc Hai & Dr. Ngo Thi Thu Thao

4. **Prerequisites**
   FISH2610

5. **Description**
   General biology and culture techniques of the major shrimp and shellfish cultured throughout the world will be discussed. Special emphasis will be given to fresh- and saltwater shrimp, crayfish and oysters.

6. **Course Content/Objectives**

7. **Objectives**
   - Present the physiological and morphological traits of crustaceans and mollusc which have a major influence on aquaculture practices.
   - Present the aquaculture practices of each species.
   - Present management considerations for each species including water quality and nutritional requirements, disease control, reproductive capability and marketing.

8. **Lecture Topics**
   a) Anatomy and general biology of marine shrimp
   b) Species of aquaculture importance
   c) Extensive culture practices
   d) Semi-intensive culture practices
   e) Intensive culture practices
   f) Hatchery techniques for marine shrimp
   g) Anatomy and general biology of freshwater prawns
   h) Hatchery techniques for freshwater prawns
   i) Culture practices for freshwater prawns
   j) Anatomy and general biology of freshwater crayfish
   k) Culture practices of North American crayfish
   l) Culture practices of European and Australian crayfish
   m) General biology and culture of other crustaceans
   n) Anatomy and general biology of oysters
   o) Culture practices of oysters
   p) Hatchery techniques of oyters
   q) General biology and culture of other mollusc

9. **Textbook**
   Two Sea Grant Publication are recommended:
   a) Practical Manual for Semi-intensive Commercial Production of Marine Shrimp by

Villalon and Red Swamp
b) Crawfish: Biology and Exploitation by Huner and Barr.
c) Additional handouts and reference materials will be presented.

10. **Laboratory topics**
There is no laboratory for this course but field trip opportunities will be offered.

11. **Grading and Evaluation Procedures**

Exam I	= 25%
Exam II	= 25%
Class Report	= 15%
Final	= 35%

A = 93-100
B = 87-92
C = 77-86
D = 70-76
F = 0-69
Grades are not scaled.

12. **Examinations**
Examinations consist of a combination of short-answer (objective) questions and discussion (subjective) questions based on lecture materials.

13. **Class Reports**
Report topics can be selected from a wide range of crustaceans or molluscs not covered in class. They can be of a particular species, technique, or process. Written (50%) and oral (50%) presentations will be made. The paper should be 10 - 15 typed pages, written as a technical paper in journal format. Oral presentations will be on the same material and presented in 12 - 15 min. as at a professional meeting. Use of visuals is encouraged.

14. **Class Attendance**
Class attendance is not mandatory but is encouraged.

27) AQUA308 (FISH 7650): Fish Genetic Enhancement and Resources Management

1. **Course Title**
   AQUA308 (FISH7650): Fish Genetic Enhancement and Resources Management

2. **Credit Hours**
   3 lectures

3. **Intructor**
   Prof. Dr. Rex Dunham
   Ms. Duong Thuy Yen & Dr. Ha Phuc Hung

4. **Prerequisites**
   ZY 3000

5. **Course Content/Objectives**

6. **Description**
   Philosophy of genetics and breeding in fishes (sport fishes and aquaculture species) and other aquatic animals, methods in fish selective breeding population genetics, conservation genetics, and genetic management of natural population of fish; traditional animal breeding, genetic engineering and other genomic manipulations for genetic enhancement of aquatic organisms; inheritance of characters responsible for efficient fish production.

   Objectives
   a) To acquaint students with genetic enhancement programs that can improve performance for economically important traits of aquatic food organisms and sport fishes.
   b) To acquaint students with the genetic basis behind these breeding programs.
   c) To enable students to design and execute genetic enhancement programs for aquatic organisms and genetically manage natural populations of fish.

7. **Outline of course contents**

   a) Goals and plans in fish breeding

   b) Experimental techniques
      The phenotype, Environmental effects, Test environments (genotype x environment interactions), Communal stocking, Magnification effect, Skewness in length distribution, Compensatory gain, Regression, Multiple rearing, Maternal effects, and Special techniques

   c) Qualitative traits (Mendelian genetics)
      Dominance and recessiveness, Linkage, Pleiotropy and Epistasis, Penetrance and expressivity, Albinism, Scaleness, Skeletal deformities, Color, Sex linkage, and Progeny testing

   d) Species and strain evaluations, Wild strains, Domestication

e) Crossbreeding (intraspecific)
Heterosis and overdominance, Domestication effects and combining ability, Recurrent reciprocal selection, Backcrossing, Maternal effects, Reciprocals

f) Inbreeding
Genetic basis of inbreeding, Calculation of inbreeding coefficients, Effects of inbreeding, Gynogenesis, Androgenesis, Genetic drift, Canalization, Maintenance of genetic quality
- Micronutrients and Other Trace Elements
- Water Pollution
- Water Quality Regulations

g) Polyploidy and nuclear transplants
Triploidy, Tetraploidy, Cloning, Nuclear transplants

h) Genetic Markers and Population Genetics:
Biochemical genetics, DNA markers, Genetic variation, Conservation genetics, Genomics, Gene Mapping

i) Genetic Engineering, the Gene, Gene Constructs Gene transfers, Expression of foreign DNA,

j) Performance of transgenic fish, Gene transfer, Environmental risk assessment, Food safety, Genotype-Environment Interactions

k) Xenogenesis, Summary and Conclusion

8. **Textbook**

a) Dunham, R.A 2004. Aquaculture and Fisheries Biotechnology: Genetic Approaches. CABI Publishing,Wallingford,UK,366p

b) Tave, D. 1985. Genetics for hatchery managers. AVI Press. 300 pp.

c) Dunham, R. A. 1996. Contribution of genetically improved aquatic organisms to global food security. International Conference on Sustainable Contribution of Fisheries to Food Security. Government of Japan and FAO, Rome, Italy, 150 pp.

d) Dunham, R. A. , K. Majumdar, E. Hallerman, G. Hulata, G. Mair, D. Bartley, M. Gupta, Z. Liu, N. Pongthana, P. Rothlisberg and G. Horstweeg-Schwark.2001.Status of aquaculture genetics and prospects for the third millenium. Pages 129-157. *in* R. P. Subasinghe, P. B. Bueno, M. J. Phillips, C. Hough, S. E. McGladdery and J. R. Arthur, editors. Proceedings of Conference on Aquaculture in the Third Millenium. Bangkok, Thailand.

9. **Grading and Evaluation Procedures**

Course Requirements: There will be three examinations, and sample problems. They

will be weighted as follows:

Exams (3)	90%
Sample problems	10%
	100%

>90% = A
80-89% = B
70-79% = C
60-69% = D
<60% = F

10. **Grading system**
The tests will be graded on a 0 to 100 point scale. Equal weight will be given to the tests and the final examination to obtain the average score for the class. Letter grades will be assigned by ranking using natural gaps in the array of scores as divisions between letter grades.

11. **Policies on unannounced quizzes and class attendance and participation**.
Students are expected to attend classes and participate in class activities. Students with special needs because of handicap or other reasons should make their needs known to the instructor in the first week of class.

12. **Justification**
This course builds upon undergraduate courses in genetics by specifically addressing genetic improvement and maintenance for aquaculture, fisheries management and conservation application. Undergraduate material is expanded and detailed. Theoretical and applied aspects of fish genetics are integrated and synthesized such that the student will leave the course with a better understanding of genetics principles and the ability to apply them in aquatic resource management careers for the benefit of the economies of Alabama, the United States and the world, for protection of our genetic resources and for global food security. Education in this area is now critical for all fisheries scientists as the importance of genetic enhancement has now reached the forefront of both the aquaculture industry and natural resources management globally.

28) AQUA316 (FISH5510): Fisheries Biology and Management

1 **Title**:
AQUA316 (FISH5510): Fisheries Biology and Management

2 **Number of Credits:** 3

3 **Instructors:**
A/Prof. Dr. Russell A. Wright
Ts. Tran Dac Dinh and Ts. Truong Hoang Minh

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours * 15 weeks = 30 lecture hours
	Laboratory:	2 lecture hours * 10 weeks = 20 lecture hours
	Private Study:	1 lecture hours * 10 weeks = 10 lecture hours

5 **Prerequisites:** Introduction to Fish Science and General ichthyology

6 **Course Objectives:**
This course aims to supply the student with:
- most basic knowledge about the fisheries biology
- requirements for fisheries monitoring
- methods for fisheries management

7 **General Course Contents**
a) Fisheries resources and fishing gears
b) Fish population biology
c) Fisheries assessment and monitoring
d) Fisheries management

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Lab. Attendance: Requisite
- Mid-term Test: Requisite
- Final Examination: Requisite

9 **Reading Materials:**
a) King, M., 1995, Fisheries biology, assessment and management. Fishing News Books, 341p.
b) David, S, 1999, Alternative management systems for fisheries. Fishing News Books, 222p.
c) Edwin, S. I. B., 1996, Living marine resources: Their utilization and management. Chapman & Hall, 403p.
d) Ray, H. and Carl, J. W., 1992, Quantitative fisheries stock assessment, Chapman and Hall, 570p.

11 **Grading System**
- Lab. Exam: 20 %
- Midterm Exam: 20%
- Final Exam: 60%

12 **Detail Description of Course**
Fisheries Resources
a) Molluscs
b) Echinoderms
c) Crustaceans

d) Fishes
e) Others
f) Productivity and Fisheries

Fishing gears and methods
a) Traps
b) Hooks and lines
c) Stationary nets
d) Towed nets and dredges
e) Surrounding nets
f) Fish aggregation devices
g) Destructive effects of fishing

Fish population biology
a) Introduction
b) Age and growth
c) Mortality
d) Reproduction and recruitment
e) Population analysis
f) Cohort identification

Fisheries Assessment and Monitoring
a) Introduction
b) Data requirements
c) Data collection
d) Data analyses and stock assessment
e) Potential yield analyses
f) Financial analyses
g) Fisheries monitoring

Fisheries Management
a) Introduction
b) Management objectives and strategies
c) Fisheries regulations

29) AQUA314 (AGEC 4000): Aquaculture Economics

1 **Course Title**
AQUA314 (AGEC 4000): Aquaculture Economics

2 **Credit Hours**
3 (3 lecture hours)

3 **Intructor**
Prof. Dr. Robert Pomeroy
Dr. Le Xuan Sinh

4 **Prerequisites**
None

5 **Course Content/Objectives**

Objectives
Application of economics and business principles by firms engaged in aquaculture. Attention is given to financial management, investment analysis and marketing management as applied to aquaculture operations. Public policy affecting aquaculture is also discussed and international aquaculture development reviewed.

Lecture topics

a) Course Overview
- Course objectives and scope
- The role of aquaculture in US and world food production
- Defining aquaculture
- Biological principles of aquaculture
- Overview of microeconomic concepts and theory

b) Economic Factors Affecting Aquaculture at the Farm Level
- An overview of production economics
- Production and cost functions
- Production efficiency analysis

c) Economic Factors Affecting Aquaculture at the Farm Level
- Economies of scale
- One, two or more variable inputs
- Bioeconomic analysis
- Application of production economics to aquaculture

d) Managerial Analysis for Aquaculture
- Management of the aquaculture business
- Recordkeeping
- Budgeting – Enterprise, partial, break-even, whole farm

e) Managerial Analysis for Aquaculture
- Cash flow analysis
- Linear programming

f) Managerial Analysis for Aquaculture

- Risk and uncertainty
- Balance sheet and income statement
- Financial ratios

g) Analyzing Aquaculture Investment Decisions
- Factors influencing investment decisions
- Time value of money and discounting
- Discounted cash flow methods

h) Analyzing Aquaculture Investment Decisions
- Benefit/cost analysis
- Business planning
- Credit and financing

i) Aquaculture Products in the Marketplace
- Analyzing aquaculture markets worldwide
- Aquaculture marketing concepts
- Aquaculture and seafood markets and institutions
- Market functions and structure
- Price analysis and marketing costs
- Farmer marketing

j) Aquaculture Products in the Marketplace
- Wholesale and retail marketing
- Marketing research
- Evaluating market potential and market plans
- Processing and post-harvest
- Transportation
- Grades and standards
- International seafood market

k) Public Policy and Aquaculture
- Regulations and permitting
- US and state aquaculture plans and programs
- Taxation
- Insurance
- Credit and loans
- Information and assistance
- Property and water rights
- Use conflicts

l) Public Policy and International Aquaculture Development
- Environment
- Biotechnology
- Food safety
- Best management practices

- Country-of-origin labeling
- Eco-labeling, organic standards
- Non-native species
- Rural aquaculture
- Integrated aquaculture systems
- Live reef trade and aquaculture

m) Class project

Each student will develop an aquaculture farm plan. The purpose of this project is to apply the methods and tools of economic analysis to an aquaculture enterprise. Each student will pick one species to analyze, such as catfish, tilapia, hard clams, oysters, shrimp, or trout, using a suitable production system, i.e., pond, raceway, pen or bottom culture.

The farm plan will include detailed biological, technological, marketing and economic considerations. Information can be obtained through the library and internet. A report will be prepared to include:

- Farm description
- Biology of selected species
- Technology of production system
- Marketing plan
- Economic analysis (to include enterprise budget, cash flow statement and sensitivity analysis)

You must discuss the project with the instructor. A choice of species and production system must be made by 14 February. The project will be on-going through the semester and periodic updates will be presented to the instructor. A final written paper on your aquaculture farm project will be due the last day of class and a presentation will be made in the last class.

Textbook

a) Curtis M. Jolly and Howard A. Clonts. 1993. Economics of Aquaculture. Food Products Press. (J&C)
b) Other readings will be assigned for selected topics.

Grading and Evaluation Procedures

- The mid-term: 30% of final grade.
- Final exam: 30% of final grade.
- Class attendance: 15% of final grade.
- Class project: 25% of final grade.

Course Policies

Students will be expected to attend class regularly. Class attendance will be a part of your final grade. No make up exam will be given to students without an excused absence from the instructor.

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30) AQUA309 (AGEC4070): Law on Agriculture and Fisheries

1 **Title**:
AQUA309 (AGEC4070): Law on agriculture and Fisheries

2 **Number of Credits:** 3

3 **Instructor**
Dr. Nguyen Ngoc Dien

4 **Distribution of Time**

Workload:	Lectures:	3 lecture hours * 10 weeks = 30 lecture hours
	Private Study:	2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:**
Generalities on law

6 **Course Objectives**
This course aims to supply the student with:
a) most basic knowledge of environmental law, of law on land and water ressources and of law on bio-diversity
b) general view of legal sanction system in the matter agricultural State management of agriculture and fisheries
c) general view of international legal cooperation in the fields of agriculture and fisheries

7 **General Course Contents**
a) Genaral view of environmental law
b) State management of environment
c) State management of land and water ressources
d) Law on bio-diversity
e) Legal sanction system in the matter of agriculture and fisheries

8 **Required Responsibility for Student**
- Lecture/Class attendance: 45 lecture hours (60% obligatory)
- Mid-term Test: obligatory
- Final Examination: obligatory

9 **Reading Materials**
a) Legal texts on environmental protection, on land and water ressources (laws and Government decrees)
b) Textbook on environmental law – Law Faculty, Can Tho University, 2004
c) Textbook on land law, Law Faculty, Can Tho University, 2006

11 **Grading System**
- Homework Assignments: …%
- Lab. Exam:
- Mid-term test: 30%
- Final Exam: 70%

12 **Detail Description of Course**
a) General view of environmental law
- Legal concepts of environment and of environmental law
- Historic evolution of environmental law
- Fundamental principles of environmental law

b) State management of environment

- Generalities of State management of environmental protection
- Basic principles of environmental protection
- Environmental protection authorities

c) State management of land and water ressources

- Generalities on ladn ressources
- Land ressources protection
- Legal regime of agricultural land
- Generalities of water ressources
- Legal regime of water ressources

d) Legal sanction system in the fields of agriculture and marine culture

- Typology of legal responsibilities
- Conditions of legal responsibility
- Repressive authorities in the fields of agriculture and fisheries

e) International legal cooperation in the fields of agriculture and marine culture

- The needs of international legal cooperation in the fields of agriculture and fisheries
- Fundamental principles
- Vietnam in the international legal life in the fields of agriculture and fisheries

31) AQUA317: Crustacean and Marine Finfish Hachery Management

1 **Copurse Title**:
AQUA317: Crustacean Hatchery Management

2 **Number of Credits:** 4

3 **Instructors**
Dr. Tran Ngoc Hai and Dr. Bui Minh Tam

4 **Distribution of Time**
Workload: Wet laboratory: **120 hours**

5 **Prerequisites:** FISH5250, FISH5240, FISH7270

6 **Course Objectives**
This course aims to supply the student with:
- Practical skills in management of crustacean and marine finfish hatcheries
- Practical skills in seed production of majors aquaculture species such as shrimp, prawn, mud crab, seabass, grouper,…

7 **General Course Contents**
a) Introduction to structure, facilities and equipments in hatcheries
b) Prepare and culture of broodstocks
c) Breeding broodstocks
d) Larval rearing
e) Live food culture
f) Fieldtrips to commercial hatcheries

8 **Required Responsibility for Student**
- Lab. Attendance: 100%
- Mini Projects/Assignment: 100%
- Discussion and/or Seminar: 100%
- Mid-term Test: 100%
- Final Examination: (oral) 100%

9 **Reading Materials**
a) New M.B., 2002. Freshwater Prawn Farming, A manual for the culture of Macrobrachium rosenbergii. FAO. 212pp.
b) Parado-Estepa F.D, Quinitio E.T. and Borlongan, 1996. Prawn Hatchery Operations. SEAFDEC. 45pp.
c) AFEC/SEAFDEC, 2001. Husbandry and Health Management of Grouper. APEC, Singapore and SEAFDEC, Philippines, 94 pp
d) John W. T. JR, 2000. Marine Fish Culture. Kluwer Academic Publishers. 750 pp
e) Sim, S.Y, M.A. Rimmer, J.D. Toledo, K. Sugama, I. Rumengan, K.C. William and M. Phillips, 2005. A guilde to Small-scale Marine Finfish Hatchery Technology. NACA, ACIAR. 17pp.

11 **Grading System**
- Homework Assignments: 20%
- Lab. Exam: 20%
- Seminar/Class presentation:
- Final Exam: (oral) 20%

12 **Detail Description of Course**
Structure, facilities and equipments in freshwater and marine hatcheries

a) Hatchery building
b) Tanks
c) Machines
d) Equipments, chemicals
e) Electric systems, water systems

Seed production of tiger shrimp
a. Preparation of hatchery
b. Broodstock culture and spawning
c. Larval rearing with different systems
d. Livefood culture

Seed production of freshwater prawn
a. Preparation of hatchery
b. Broodstock culture and egg hatching
c. Larval rearing with different systems

Seed production for seabass
a) Broodstock selection and induced breeding
b) Egg incubation
c) Larval rearing

Seed production of mud crab
a) Preparation of hatchery
b) Broodstock culture and egg hatching
c) Larval rearing with different systems

Fieldstrip to commercial hatcheries
a. Shrimp hatcheries
b. Freshwater prawn hatcheries
c. Marine finfish hatcheries

3.2.3) Supportive courses

32) KT101 (ECON 2020): Principles of Economics

1	**Title**: **KT101 (ECON 2020):** Principles of Economics
2	**Number of Credits:** 2
3	**Instructors** Vo Thanh Danh and Le Khuong Ninh
4	**Distribution of Time** Workload: Lectures: 2 lecture hours * 15 weeks = 30 lecture hours Private Study: 4 lecture hours * 15 weeks = 60 lecture hours
5	**Prerequisites:**
6	**Course Objectives** Objective of the course is to offer to the learner the general knowledges on economics. Behaviors of economic agents and market mechanism will be briefly presented in the course. In addition, marcro equilibriums and government intervention will be also mentioned in the course.
7	**General Course Contents** Student will learn the essentials of economics regarding to theories of demand and supply, theory of consumer, theory of production and theory of market. In addition, Keynesian marcroeconomics topics on agregate demand and agregrate supply
8	**Required Responsibility for Student** - Lecture/Class attendance: 80% - Mid-term Test: 100% - Final Examination: 100%
9	**Reading Materials** 1. N. Gregory Mankiw. 2004. Essentials of Economics. Thomson South Western. 2. David Begg. 2007. Kinh tế học. Nhà xuất bản giáo dục 3. Phạm Chung. 2004. Phân tích kinh tế vĩ mô. Nhà xuất bản thống kê.
10	**Criteria of Evaluation** - Pass examinations
11	**Grading System** - Mid term Exam: 50% - Final Exam: 50%
12	**Detail Description of Course** **Essentials of economics** a) Definition of Economics b) Microeconomics and Marcroeconomics c) Production Possibility Function **Microeconomics** a) Theory of supply and demand b) Theory of consumer c) Theory of production

Marcroeconomics

a) Gross Domestic Product Measurement
b) Agregrate supply and demand
c) Inflation anf Unemployment

33) AQUA207 (STAT 2510): Statistics and Experimental Design in Aquaculture

1 **Title**:
AQUA207 (STAT 2510): Statistics and Experimental design in Aquaculture

2 **Number of Credits:** 3

3 **Instructors:**
Dr. Do Van Xe and Dr. Tran Dac Dinh

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours * 15 weeks = 30 lecture hours
	Laboratory:	2 lecture hours * 10 weeks = 20 lecture hours
	Private Study:	1 lecture hours * 10 weeks = 10 lecture hours

5 **Prerequisites:** Calculus (MATH1610) and Principles of Biology (BIOL1020)

6 **Course Objectives:**
This course aims to supply the student with:
a) most basic knowledge about the probability and statistics
b) methods to design experiments in aquaculture
c) data collection and analysis

7 **General Course Contents**
a) Introduction to statistics
b) Hypothesis test
c) Experimental designs
d) Regression and correlation analysis
e) Apply statistical software for analyses data

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80% of lectures
- Lab. Attendance: Requisite
- Mid-term Test: Requisite
- Final Examination: Requisite

9 **Reading Materials:**
a) Kwancha, A. G. and Arturo, A. G, 1984, Statistical procedures for agriculture research. John Wiley and Sons, 680p.
b) Zar, J. H., 1996, Biostatistical Analysis. Prentice Hall, 662p.
c) Chris, B., Francis, G. and Peter, Mc., 1993, Asking questions in biology: Design, Analysis and Presentation in Practical work. Longman Group UK limited, 157p.
d) Fowler, J., Cohen, L. and Jarvis, P., 1998, Practical Statistics for Field Biology. John Wiley and Sons, 259p.

10 **Criteria of Evaluation:** not required

11 **Grading System**
- Lab. Exam: 20 %
- Midterm Exam: 20%
- Final Exam: 60%

12 **Detail Description of Course**
Introduction to Statistics
a) Population and sample

b) Types of data
c) Methods of data collection
d) Descriptive of statistics

Probability Distributions
a) Probability
b) Probability distribution
c) Binomial probability distribution
d) Normal probability distribution
e) Poisson distribution
f) Sampling distribution of means
g) Student's t distribution
h) Chi square distribution
i) Fisher distribution

Hypothesis Tests
a) Formal hypothesis test
b) One-sample hypothesis
c) Two-sample hypothesis
d) Paired-sample hypothesis

Single-factor Experiments
a) Introduction
b) Analysis of variance (ANOVA)
c) Completely randomized design (CRD)
d) Randomized completely block design (RCB)
e) Latin square design (LS)

Two-factor Experiments
a) Introduction
b) Complete block design
c) Split-plot design
d) Strip-plot design

Three-or-more-factor Experiments
a) Introduction
b) Alternative designs
c) Split-split-plot design

Comparison Between Treatment Means
a) Introduction
b) Least significant difference test (LSD)
c) Duncan's multiple range test

34) AQUA213: Scientific Research Methodology

1. **Title**:
   AQUA213: Scientific Research Methodology

2. **Number of Credits:**
   2 (2 lecture hours)

3. **Degree:**
   Bachelor

4. **Distribution of Time**

Workload:	Lectures:	2 lecture hours x 10 weeks = 20 lecture hours
	Laboratory:	2 lecture hours x 5 weeks = 20 lecture hours
	Private Study:	2 lecture hours x 15 weeks = 30 lecture hours

5. **Prerequisites:**
   None

6. **Course Objectives**
   The course aims to introduce student basic knowledge and skill in searching scientific information, writing research proposal, project report and scientific paper, and preparing and presenting oral and poster paper. In addition, an emphasis will also be given on writing thesis proposal and report.

7. **General Course Contents**
   f) Scientific information sources and searching
   g) Research proposal preparation
   h) Research report and paper writing
   i) Preparation and presentation of oral and poster paper.

8. **Required Responsibility for Student**
   - Class attendance: minimum 80% of lectures
   - Mini projects: complete 100% requirement
   - Class discussion and/or seminar: active participation
   - Mid-term test
   - Final examination

9. **Reading Materials**
   a) NORAD (1999). The logical framework approach (LFA). Fourth edition. 106p
   b) Stapleton, P. (1987). Writing research papers: An easy guide non-native-English speaker. Australian Center for International Agricultural Research. 47p.
   c) Robert B. (1987). Scientists must write: A guide to better writing for scientists, engineers and student. Chapman & Hall. 176 p.
   d) Shortland. M. and J. Gregory (1991). Communicating science: A handbook. Longman. 186p.

10. **Criteria of Evaluation**
    No

11. **Grading System**
    - Homework assignments: 20%
    - Mid-term exam: 20%
    - Final exam: 60%

12. **Detail Description of Course**

Concepts of science and scientific research

- What is science?
- What is scientific research?
- Types of scientific research

Assess of information

- Sources of information or reading materials
- Method for searching scientific information
- Methods for reading and reviewing information
- Introduction to common sources of information in aquaculture and fisheries

Writing research proposal

- Concept and types of research proposal
- Concept note preparation
- Research proposal preparation
- Introduction to common research proposal formats
- Preparation of bachelor thesis proposal
- Logical framework approach (LFA)

Writing research report, paper and thesis

- Importance in writing report/paper
- What is scientific report and its types
- Writing scientific project report
- Writing scientific paper

Preparation and presentation of oral and poster paper

- Preparation of oral presentation using PowerPoint
- Method for oral presentation
- Method for poster preparation
- Method for writing and presenting graduation thesis or assignment

Class assignment (working in group)

- Preparation of research proposal or graduation thesis proposal
- Preparation and presentation of oral/poster paper
- Information searching using computer and library

3.4 Elective courses

35) AQUA214 (AGEC4000): Principles of Ecology

Title:

1 AQUA214 (AGEC4000): Principle of Ecology

2 **Number of Credits:** 2

Instructors

3 Dr. Vu Ngoc Ut

4 **Distribution of Time**

Workload: Lectures: 2 lecture hours * 15 weeks = 30 lecture hours
Private Study: 2 lecture hours * 15 weeks = 30 lecture hours

5 **Prerequisites:** BIOL1020

6 **Course Objectives**

This course aims to supply the student with knowledge on concepts of ecology, ecosystems, relationships between organism and ecosystems, nature of ecosystems, functions of ecosystems, and aquatic ecosystems as the basics for further study and conservation of ecosystems and biodiversities.

7 **General Course Contents**

a) General concepts of ecology and ecosystems
b) Nature of ecosystems
c) Population ecology
d) Community ecology
e) Aquatic ecology and ecosystems

8 **Required Responsibility for Student**

- Class attendance: at least 80%
- Discussion and presentation: there will be 2-3 discussions and presentation during the course, students must participate 90% of the time of discussion and /or 100% of presentation task
- Mid-term quizzes: must take 100% of quizzes (2 times)
- Final exam: must take final exam, there will be no make-up exams

9 **Reading Materials**

a) Kormondy, E.J., 1996. Concepts of Ecology, fourth edition. 559 p.
b) Barnes, R.S.K., and Mann, K.H. (eds), 1991, Fundamentals of Aquatic ecology. Blackwell Science Ltd. 270p.
c) John W. Day, Charles A. S. Hall, W. Michael Kemp, A. Yá&nmacr;ez-Arancibia, 1989, Interscience,
d) Alongi, D.M., 1997, Coastal ecosystem processes. CRC press, pp.

11 **Grading System**

- Presentation: 30%
- Mid-term exams: 20%
- Final exam: 50%

12 **Detail Description of Course**

Concepts of ecology and ecosystems

a) Ecology as science
b) Nature of ecosystems
c) Biotic and abiotic environments

Energy flow and nutrient cycles in the ecosystems
a) Energy fixation by autotrophs
b) Energy flow beyond the producers
c) Gaseous and sedimentary nutrient cycles
d) Nutrient budget and ecosystem

Population and Community ecology
a) Population structure and growth
b) Population regulation
c) Community structure and functions
a) Stability and changes in community

Aquatic ecosystems
a) Freshwater ecosystems
b) Marine ecosystems

36) AQUA311: Planning for Aquaculture development

1 **Course title:**
AQUA311: Planning for Aquaculture development

2 **Number of credit**: 2

3 **Instructors**
Dr. Truong Hoang Minh and Dr. Tran Ngoc Hai

4 **Duration of lecture**
Workload - Lecture: 2 tiết/tuần x 15 tuần = 30 tiết

5 **Prerequisites:**
Aquaculture production, Crustacean and molluscan aquaculture, Aquaculture economics.

6 **Course Objectives:**
This course will provide students with knowledges on:
a) Basic knowledge on planning and management for aquaculture development
b) Design and implementation of aquaculture planning
c) Tools and methods of planning

7 **General Course Contents**
a) Overview on global and national aquaculture development and requirement for planning.
b) Basic concepts in aquaculture planning and management
c) Design and implementation of planning
d) Tools and methods of aquaculture planning

8 **Required Responsibility for Student**
- Lecture attendance: 80%
- Reading references and assignment: 20%
- Mid-semester exam: Requisite
- Final exam: Requisite

9 **Reading materials**

a) Colin, E. Nash., 1995. Aquaculture sector planning and management. Fishing News Books.
b) Commonwealth of Australia, 1998. Good practice guidelines for integrated coastal planning.
c) Townsley, P., 1996. Rapid rural apprisal, participatory rural apprisal and aquaculture. FAO Fisheries Technical paper No. 358. Rome, FAO. 1996. 109p.
d) FAO., 1999. Planning and management for sustainable coastal aquaculture development.
e) FAO., 2002. The state of world fisheries and aquaculture. Rome, Italia.
f) Nitin, K. Tripathi, 2000. Lecture note on Principles of Geographic Information System (GIS). AIT, Thailand.
g) Reidar, D. and New, D., 2000. Organisations and development, strategies, structures and processes. Thousand Oaks/London.
h) Robert Kay and Jacqueline Alder, 1999. Coastal planning and management. New York.
i) SEACAM., 2000. Guidelines for environmental assessment of coastal aquaculture development.

j) Thomas, M. Lillisand and Ralph, W. Kiefer, 2000. Remote sensing and image interpretation. USA.
k) UN., 1995. Planning guidelines on coastal environmental management. New York.

11 **Grading System**

- Assignment: 20%
- Mid-semester exam: 30%
- Final exam: 50%

12 **Detail course content**

Overview on global and national aquaculture development and requirement for aquaculture planning

a) Global and Vietnam aquaculture development
b) Sustainable development
c) Cost and benefit of aquaculture development
d) Requirements of aquaculture planning and management

Concepts of aquaculture planning

a) Planning
b) Zoning
c) Differences between planning and zoning
d) Top-down planning
e) Bottom-up planning
f) Differences between development project and program

Design and implementation of aquaculture planning

a) General diagram of planning
b) Steps of design and implementing of planning for aquaculture development

Tools and methods of aquaculture planning

a) Institutional, political and stakeholder analysis
b) Technique of participatory rural appraisal (PRA)
c) Environmental carrying capacity assessment and its' dynamic changes
d) Evaluation of socio-economic and technical aspects
e) Application of remote sensing and geographical information system
f) Analytical technique in suitable aquaculture zoning

37) AQUA312: Live food production

1. **Course Title**
   AQUA312: Live food production

2. **Credit: 2**

3 **Instructor**
   Dr. Nguyen Van Hoa and Msc. Tran Suong Ngoc

4 **Distribution of Time**

Workload:	Lectures:	2 lecture hours x 10 weeks = 20 lecture hours
	Lab study:	2 lecture hours x 5 weeks = 20 lecture hours
	Private study:	1 lecture hours * 15 weeks = 30 lecture hours

3. **Prerequisites**
   None

4. **Course Objectives**

The objective of this course is to provide the opportunity for students to become knowledgeable about biology of live-feeds for aquaculture such as: micro-algae, rotifer, Artemia, Moina- Daphnia and tubifex… and information sources on biology, nutrient and culture procedures

5. **General Course Contents**

a) Role of live food in aquaculture
b) Biology and production techniques for major important species
c) Culture practice for some important species (algae, Artemia, Rotifer,…)

6. **Required Responsibility for Student**

- Lecture/Class attendance: 80%
- Lab work attendance: 100%
- Mid-term Exam attendance: 100%
- Final Examination: Requisite

7. **Textbook**

a) Patrick Lavens and Patrick Sorgeloos (1996). Manual on the production and use of live food for aquaculture.
b) Robert A. Browne, P. Sorgeloos and C.N.A. Trotman (1991). Artemia biology.
c) Sorgeloos, P. (1986). Manual for the culture and use of brine shrimp in aquaculture.
d) Frank H. Hoff and T.W.Snell (2003). Plankton culture manual.

8. **Detail Description of Course**

Tentative course outline is as follows:

Theory part

a) Introduction
b) Live food production overview
c) Role of live food in aquaculture
d) Micro-algae biology and culture systems
e) Rotifer biology and culture systems
f) Artemia biology and culture systems
g) Moina and daphnia biology and culture systems

h) Tubifex, polychaeta and earth-worm biology and culture systems

Lab. Work

a) Micro-algae culture
b) Rotifer culture
c) Moina culture
d) Artemia culture

9. **Grading and Evaluation Procedures**

Examinations and grading

a) Mid-term exam = 20%
b) Seminar = 30%
c) Final examination = 50%

e) **Class policies**

Students are expected to be present for every class session except for documented emergencies and excused absences. Professional behavior is expected at all time during the class, laboratory and field trips. Any student not maintaining a professional demeanor will receive one oral warning for the first problem, if there is another problem the student will lose one letter grade, if there are any additional problems the student will be given a failing grade.

38) AQUA313 (FISH5670): Agriculture Extension

1 **Title**
AQUA313 (FISH5670): Agriculture Extension

2 **Number of Credits** 2

3 **Instructor**
Dr. Tran Thanh Be

4 **Distribution of Time**
Workload: Lectures: 2 lecture hours * 12 weeks = 24 lecture hours
Seminars: 4 lecture hours * 03 weeks = 12 lecture hours
Private study, homework: 2 lecture hours * 15 weeks = 30 lecturehours

5 **Prerequisites:** None (or COMM 1000 + FISH 2100 / FISH 5250)

6 **Course Objectives**
This course is aimed to supply the 3th year students with:
a) Basic knowledge on agricultural extension
b) Situations of extension in Vietnam
c) Skills in implementation of extension activities

7 **General Course Contents**
d) Concepts and principles of agricultural extension
e) Regulations and situations of extension in Vietnam
f) Methodologies and skills in implementation of extension activities

8 **Required Responsibility for Student**
- Lecture/Class attendance: 80%
- Homework assigments: 100%
- Seminars (group): 100%
- Final Examination: Requisite

9 **Reading Materials**
a) Flores, T.G., Bueno, P.B. and Lapastora, R.D., 1983, Handbook for Extension Work, SEAMEO Regional Centre for Graduate Study and Research in Agriculture, Laguna, Philippines
b) IRRI Training Centre, 1990, Designing and Producing Instructional Media and Materials, International Rice Research Institute, Laguna, Philippines
c) Tran Thanh Be, 2004, Agricultural Extension in Vietnam - Alternative Institutional Arrangements, PhD Thesis, University of Sydney, Australia
d) Van den Ban, A.W. and Hawkins, H.S., 1996, Agricultural Extension, Blackwell Science, Netherlands

10 **Criteria of Evaluation**
None

11 **Grading System**
- Homework Assignments: 20%
- Seminar/Group Presentation: 30%
- Final Exam: 50%

12 **Detail Description of Course**
Concepts on extension
a) Concepts and development of agricultural extension
b) Philosophy, principles of extension
c) Research – Extension – Application relationships

d) Stakeholders' participation

Vietnam extension

a) Regulations of Vietnam extension: principles, objectives and activities
b) Vietnam extension and related organisation systems
c) Village extension worker
d) Issues of extension in Vietnam

Extension methodologies

a) Diffusion and adoption of innovation
b) Approaches and methods of extension
c) Education and extension, adult learning
d) Age related issues and adjustments in extension activities

Principles in conducting extension materials

a) Basic principles
b) Principles for different extension materials
c) Colour uses in extension materials