

BACHELOR OF SCIENCE IN BIOTECHNOLOGY
COURSE SPECIFICATION
SH03052: BIOTECHNOLOGY IN ANIMAL BREEDING

I. Information about the course

- Course code: SH03052
- Semester: 07
- Number of credits: 2 (2; 0; 6)
- Credit hours for learning activities
+ Theoretical lessons in the class: 45 periods
- Self-studying: 90 periods (according to individual plans, and based on the lecturer's instructions)
- Units in charge:
 - Department: Animal Biotechnology
 - Faculty: Biotechnology
- The course belongs to the following knowledge group:

General knowledge <input type="checkbox"/>		Foundation knowledge <input type="checkbox"/>		Specialized knowledge <input checked="" type="checkbox"/>	
Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input type="checkbox"/>	Compulsory <input type="checkbox"/>	Elective <input checked="" type="checkbox"/>

- Prerequisite course: Human and Animal Biology (SH02002)
- Language used for teaching: Vietnamese

II. Course objectives and course expected learning outcome

*** The objectives of the course:**

The course aims to provide students with the following knowledge:

+ Scientific basis, development and new achievements in the field of biotechnology in animal breeding, including:

- ✓ Concepts and principles of animal selection-breeding;
- ✓ Traditional technology in animal breeding;
- ✓ Genetic engineering applied in animal breeding;
- ✓ Genetically modified animals.

The course aims to provide students with the following skills:

+ Apply creative critical thinking in collecting, analyzing, evaluating, selecting and synthesizing specialized documents.

+ Working and reporting project.

The course helps students develop the following qualities:

+ Active and creative; eager to learn; conscious accumulation of knowledge and lifelong self-learning.

*** The Expected Learning Outcomes for the *Bachelor of Biotechnology* program**

Expected learning outcomes (ELOs) of the Bachelor of Science in Biotechnology program		Cognitive level
Upon graduation, graduates would be able to:		
General Knowledge	ELO1: Apply knowledge of mathematics, social sciences, natural sciences, laws, and contemporary issues into the field of biotechnology.	Apply
	ELO 2: Analyze the needs and requirements of stakeholders for the purposes of management, production, and sales of biotechnology products.	Analyze
Professional Knowledge	ELO3: Evaluate the quality of biotechnology products with regard to biosafety standards, environmental protection, legal, and ethical standards.	Evaluate
	ELO4: Develop ideas for biotechnology products based on personal knowledge of natural sciences, life sciences, and analysis of social needs.	Create
	ELO5: Design production models for biotechnology products	Create
General Skills	ELO6: Apply critical and creative thinking skills to effectively solve issues related to research, technology transfer, and production in the field of biotechnology.	Adaptation
	ELO7: Coordinate with team members to achieve set goals, either as a team member or team leader.	Origination
	ELO8: Communicate effectively through various channels in the diverse contexts of the workplace; satisfy English proficiency levels as required by the Ministry of Education and Training.	Origination
Professional Skills	ELO9: Utilize information technology and equipment effectively for management, production, and sales in the field of biotechnology.	Adaptation
	ELO10: Use appropriate methods and skills to collect, analyze, interpret data in scientific research, and examine practical issues at the workplace.	Adaptation
	ELO11: Perform basic and intensive technical procedures fluently in the field of biotechnology	Adaptation
	ELO12: Advise customers and partners on biotechnology products with a positive business perspective.	Adaptation
Attitude	ELO13: Comply with the laws of the biotechnology industry, and conform to occupational safety principles at the workplace.	Valuing
	ELO14: Maintain professional ethics, fulfill one's duty to improve the well-being of the society, and protect the environment.	Valuing
	ELO15: Perform the habits of updating knowledge and experiences to improve one's professional qualifications	Characterizing

*** Course expected learning outcomes (CELOs):**

The course contributes to the expected learning outcomes of the program at the following levels: *I - Introduction*); *P -Practice*; *R - Reinforce*; *M –Master*

Course code	Course name	Contribution level towards the expected learning outcomes of the program

SH03052	Biotechnology in animal breeding	ELO1	ELO2	ELO3	ELO4	ELO5	ELO6	ELO7	ELO8
			R				R		
		ELO9	ELO10	ELO11	ELO12	ELO13	ELO14	ELO15	
			R		R		P	R	

Code	Course expected learning outcomes Upon completion of this course, students are able to:	ELOs of the program
Knowledge		
CELO1	Analyze the needs and requirements of stakeholders for biotechnology products for management, production and business. Analyze the following issues: <ul style="list-style-type: none"> ✓ Concepts and principles of animal selection-breeding; ✓ Traditional technology in animal breeding; ✓ Genetic engineering applied in animal breeding; ✓ Genetically modified animals. 	ELO2
Skills		
CELO2	Apply critical and creative thinking to effectively solve research, technology transfer and production problems in the biotechnology industry.	ELO6
CELO3	Apply methods and skills to collect, analyze and process information in scientific research and investigate problems of professional practice.	ELO10
CELO4	Advise customers and partners on biotechnology products with a positive business perspective.	ELO12
CELO5	Maintain professional ethics, fulfill one's duty to improve the well-being of the society, and protect the environment.	ELO14
Attitude		
CELO6	Make a habit of updating knowledge and experience to improve your professional level.	ELO15

III. Summary of course content

SH03052. Biotechnology in Animal Breeding: 2 credits (2-0-6).

Chapter 1: Introduction

Chapter 2: Concepts and principles of animal breeding

Chapter 3: Traditional technology in animal breeding

Chapter 4: Genetic engineering applied to animal breeding

Chapter 5: Genetically modified animals

IV. Teaching and learning methods

1. Teaching methods

- ✓ Lecturing method
- ✓ Teaching with videos
- ✓ Online-Teaching MSTeams-Vnua

2. Learning methods

- ✓ Listen to lectures in class
- ✓ Join the project team
- ✓ Online learning (E-learning) MSTeams-Vnua

V. Requirements for students

- Attend class (classroom class or online class-MSTeams-Vnua): Students must attend the class fully according to the regulations of the University, participate in expressing opinions, discussing and developing articles.
- Preparing for the lecture: Students attending this module are required to read the lecture and reference materials before learning related content.
- 15-minute exercises and tests (if any): Students must complete the exercises and tests in 15 minutes.
- Essays (if any): Students must fully prepare essays, participate in discussions and pass tests.
- Must take the midterm exam, the final exam and must pass the requirements.
- For online learning: students need to install learning software and fulfill the teacher's requirements for online learning.

VI. Scoring and assessment

1. Scale: 10

2. The average score of the course is score of each rubric multiplying with the corresponding weight of each rubric

- ✓ Rubric 1 - Attendance: 10%
- ✓ Table 1 - Mid-term exam score: 30%
- ✓ Table 2 - Final exam score: 60%

3. Assessment methods

The criteria, rubrics, and assessment methods	CELOs to be assessed	Percentage (%)	Time / Studying week
<i>Progress assessment</i>		40	
Attendance (Rubric 1)	K1, K2, K3, K4, K5, K6	10	Week 1 to week 13
Mid-term exams (Table 1)	K1	30	Week 7 or week 8
<i>End-of-course assessment</i>		60	
Final exam (Table 2)	K1	60	At least 2 weeks after the end of the course

Rubic 1: Attendance class

Criteria	Percentage	Excellent 8.5 - 10 points (A)	Good 6.5 - 8.4 points (C+, B, B+)	Average 4.0 – 6.4 points (D, D+, C)	Poor 0 – 3.9 points (F)
Participation time	50%	Participation \geq 19 periods (4.5 - 5.0d)	Participation 14-18 periods (3.5 - 4.0d)	Participation 9-13 periods (2.0 - 3.0d)	Participation <9 periods (0 - 1.5d)
Participation attitude	50%	Actively participate (4.5 - 5.0d)	Not really actively participate (3.5 - 4.0d)	Occasionally participate (2.0 - 3.0d)	Rarely participate (0- 1.5d)

**Table 1: Criteria and contents for assessment of mid-term exams
(Maximum score of 10/10)**

CELOs that are assessed through the exam	Exam content	Performance indicator (Students are required to perform and be evaluated based on these indicators)

K1 Apply basic knowledge to analyze problems in the field of biotechnology in animal breeding	Chapter 1: Introduction	Indicator 1: Present and analyze the role of biotechnology in animal breeding
	Chapter 2: Concepts and principles of animal breeding	Indicator 2: Present and analyze the concepts and principles of animal selection and breeding
	Chapter 3: Traditional technology in animal breeding	Indicator 3: Present and analyze traditional technology in animal selection and breeding

The form of essay or multiple-choice exam, thematic; online or at the exam room according to the University's regulations.

Table 2: Criteria and contents for assessment of final exams
(Maximum score of 10/10)

CELOs that are assessed through the exam	Exam content	Performance indicator (Students are required to perform and be evaluated based on these indicators)
K1 Apply basic knowledge to analyze problems in the field of biotechnology in animal breeding	Chapter 1: Introduction	Indicator 1: Present and analyze the role of biotechnology in animal breeding
	Chapter 2: Concepts and principles of animal breeding	Indicator 2: Present and analyze the concepts and principles of animal selection and breeding
	Chapter 3: Traditional technology in animal breeding	Indicator 3: Present and analyze traditional technology in animal selection and breeding
	Chapter 4: Genetic engineering applied to animal breeding	Indicator 4: Present and analyze genetic techniques applied in animal breeding
	Chapter 5: Genetically modified animals	Indicator 5: Present and analyze the Genetically modified animals

The form of essay or multiple-choice exam, thematic; online or at the exam room according to the University's regulations.

4. Requirements of the course

- ✓ Late submission: Late submission of assignments, discussions, and essays will result in a 50% deduction of marks.
- ✓ Taking exams: Failure to participate in any test will result in a score of 0 for that test.
- ✓ Ethical requirements: According to the requirements of the Vietnam National University of Agriculture.

VII. Textbook / reference materials

*** Textbook /Lectures:**

1. Nguyen Hoang Thinh, Nguyen Chi Thanh, Chu Tuan Thinh (2018). Textbook of Animal Genetics. Agricultural Academy Publishing House.
2. Dang Thai Hai, Ngo Thi Thuy, Bui Huy Doanh (2017). Textbook of Animal Biochemistry. Agricultural University Publishing House.

3. Vo Thi Thuong Lan (2017). Textbook of Cellular and Applied Molecular Biology. Vietnam Education Publishing House.

Reference materials:

1. Tran Thi Binh Nguyen, Nguyen Huu Duc, Vu Duc Quy, Pham Thu Giang, Nguyen Manh Linh, Dinh Thi Ngoc Thuy and Nguyen Thi Dieu Thuy (2018). Polymorphism Candidate Genes of Indigenous Lien Minh Chickens. Vietnam Journal of Agricultural Sciences, 1(2): 174-181.
2. Bui Ha My, Nguyen Thi Huong, Nguyen Huu Duc, Tran Thi Thuy Ha (2018). Study of genetic diversity of the spotted pompano (*Hemibagrus guttatus* Lacepede, 1803) using microsatellite markers. Journal of Biotechnology, 16(1): 59-65.
3. Nguyen Ngoc Chinh, Ha Duy Ngo, Nguyen Huu Duc, Nguyen Thuy Linh, Pham Ngoc Doanh (2018). Morphological and molecular characteristics of *Kudoa comberomori* (Myxosporea: Kudoidae) were first recorded in *Scomberomorus guttatus* (Scombridae) in coastal waters of Quang Binh province. Journal of Biology, 40(1): 1-6.
4. Tran Thi Binh Nguyen, Nguyen Huu Duc, Nguyen Thi Dieu Thuy (2018). Prolactin gene polymorphisms related to egg production in Lien Minh chicken breed. Journal of Biotechnology 16(2): 259-266.
5. Vu Thi Trang, Le Thi Quynh Chi, Chu Chi Thiet, Nguyen Huu Duc, Tran Thi Thuy Ha (2018). Genetic relationship of asiatic hard clam populations collected in northern coastal provinces in Vietnam based on mtDNA sequence analysis. Journal of Aquaculture & Marine Biology, 7 (1): 55-59.

*** Online references:**

Impact of Biotechnology on Animal Breeding and Genetic Progress.

https://www.researchgate.net/publication/227140145_Impact_of_Biotechnology_on_Animal_Breeding_and_Genetic_Progress

VIII. Teaching plan

Week	Content	CELOs
	<i>Chapter 1: Introduction</i>	K1, K2, K3, K4, K5, K6
	A/ Main content in class: (02 periods) Theoretical content: 1.1. Introduction 1.2. Research history and some typical achievements 1.2.1 The development of livestock breeds in the world 1.2.2 Breeding and breeding livestock in Vietnam	
	B/ Contents to be self-study at home: (06 periods) Read the syllabus, lectures and find out information related to the content of the chapter.	
	<i>Chapter 2: Concepts and principles of animal breeding</i>	K1, K2, K3, K4, K5, K6
	A/ Summary of the main content in class: (06 periods) Theoretical content: 2.1. The concept of breed and lineage of livestock 2.2. Applied genetic parameters in livestock breeding 2.2.1. Heredity coefficient 2.2.2. Genetic correlation coefficient 2.2.3. Repeat coefficient 2.2.4. Selective effect 2.2.5. Selective statistics 2.2.6. Selective intensity 2.2.7. Generation gap 2.3. Selection and mating pairing	

Week	Content	CELOs
	2.3.1. Pedigree and closed relatives 2.3.2. Additive genetic relationship 2.3.3. Inbreeding coefficient 2.3.4. Selection of livestock for breeding 2.3.5. Discard livestock 2.3.6. Estimating breed value - introducing the BLUP method 2.4. The concept of growth, reproduction and productivity of livestock 2.4.1. The concept 2.4.2. Laws, influencing factors, growth and development 2.4.3. Methods of assessing fertility indicators 2.4.4. Production capacity of livestock (production of milk, meat, eggs)	
	B/ The contents to be self-study at home: (18 periods) Read the syllabus, lectures and find out information related to the content of the chapter.	
	<i>Chapter 3: Traditional technology in animal breeding</i>	K1, K2, K3, K4, K5, K6
	A/ Summary of the main content in class: (06 periods) Theoretical content: 3.1. General principles of creating new varieties 3.2. Hybridization methods for the purpose of creating new varieties 3.2.1. Improved hybrid (topcrossing) 3.2.2. Grading up 3.2.3. Crossing (crossing) 3.3. Mutational Methods 3.3.1. Chromosomal mutation 3.3.2. Gene mutation	
	B/ Contents to be self-study at home: (18 periods) Read the syllabus, lectures and find out information related to the content of the chapter.	
	<i>Chapter 4: Genetic engineering applied to animal breeding</i>	K1, K2, K3, K4, K5, K6
	A/ Summary of the main content in class: (12 periods) Theoretical content: 4.1. Molecular markers in animal breeding – MAS 4.1.1. Molecular marker definition 4.1.2. Types of molecular markers 4.2. Identification of marker loci 4.2.1. Candidate gene approach 4.2.2. Line strategy 4.3. Identification of genes that affect the trait 4.4. Application of marker information or marker gene 4.4.1. Genetic assessment 4.4.2. Selection within a breed 4.4.3. Breeding Program 4.5. Important marker genes in animal breeding 4.5.1. Genes involved in lactation 4.5.2. Genes involved in meat production	

Week	Content	CELOs
	4.5.3. Genes involved in egg production	
	B/ Contents to be self-study at home: (36 periods) Read the syllabus, lectures and find out information related to the content of the chapter.	
	Chapter 5: Genetically modified animals	K1, K2, K3, K4, K5, K6
	A/ Summary of the main content in class: (04 periods) Theoretical content: 5.1. Concepts and principles of animal transgenic engineering 5.2. Random animal transgenic engineering 5.3. Direct genetic engineering - gene transfer 5.3.1. Biological principles of animal transgenic engineering 5.3.2. Extraction, isolation and assembly of gene expression in animal cells 5.3.3. Transgenes into cells 5.3.4. Test animals created from transgenic embryos 5.3.5. Meaning and some achievements of animal gene transfer in breeding	
	B/ Contents to be self-study at home: (12 periods) Read the syllabus, lectures and find out information related to the content of the chapter.	

IX. Lecturer requirements for the course:

- Classrooms: required to have enough tables, chairs, boards, chalk, light, ventilation, and hygiene.
- Teaching facilities: projectors, speakers, internet, E-learning.
- E-learning: online teaching software (MSTeams), computers, server systems and infrastructure connecting to the Internet with bandwidth to meet user requirements, without network congestion or overload. Online classrooms are full of light, soundproof, well-ventilated, tidy, neat and clean.

X. Revisions (The course specification is revised annually according to the regulations of the University)

- 1st revision: 7/2018
- 2nd revision: 7/2019
- 3rd revision: 7/2020

HEAD OF DEPARTMENT
(Name and signature)

Nguyen Huu Duc

Hanoi, July 29th, 2020
LECTURER
(Name and signature)

Nguyen Huu Duc

DEAN
(Name and signature)

**ON BEHALF OF THE PRESIDENT
VICE PRESIDENT**

APPENDIX
INFORMATION ABOUT LECTURERS WHO ARE TEACHING THE COURSE

Lecturer in charge of the course

1. Full name: Nguyen Huu Duc	Title / Degree: PhD.
Workplace address: Trau Quy, Gia Lam, Hanoi	Phone no.: 0399606099
Email: nhduc@vnua.edu.vn	Website: http://www.vnua.edu.vn/khoa/cnsh/index.php/vi/
Students can contact the lecturers teaching the course through the following ways:	
<ol style="list-style-type: none"> 1. Phone calls; 2. Writing emails to the lecturers; 3. Arrange a meeting with the lecturer; 4. Meet and discuss with the instructor during office hours as provide by the instructor. 	

Supporting lecturer

2. Full name: Tran Thi Binh Nguyen	Title / Degree: PhD.
Workplace address: Trau Quy, Gia Lam, Hanoi	Phone no.: 0944661010
Email: ttbnguyen@vnua.edu.vn	Website: http://www.vnua.edu.vn/khoa/cnsh/index.php/vi/
Students can contact the lecturers teaching the course through the following ways:	
<ol style="list-style-type: none"> 1. Phone calls; 2. Writing emails to the lecturers; 3. Arrange a meeting with the lecturer; 4. Meet and discuss with the instructor during office hours as provide by the instructor. 	