THE UNIVERSITY STANDARD PROGRAMME

MAJOR: BIOTECHNOLOGY

CODE: 7420201

(Issued under the Decision No. 3343/QĐ-ĐHQGHN, on October 25, 2019 by the Rector of the VNU University of Science, Vietnam National University, Hanoi)

PART I: GENERAL INTRODUCTION OF THE PROGRAMME

1. General introduction of the programme

- *Name of programme:*

+ In Vietnamese: Công nghệ sinh học

+ In English: The programme of Bachelor of Science in Biotechnology

- Training code: 7420201

- Graduation title: Bachelor of Science

- Training period: 4 years

- Name of diploma:

+ Vietnamese: Cử nhân ngành Công nghệ sinh học

+ English: The Degree of Bachelor of Science in Biotechnology

- University in charge: VNU University of Science (VNU-HUS), Vietnam National University, Hanoi (VNU).

2. Objectives of the programme

The programme of BSc Biotech equips students with a high ethical quality, solid basic and specialised knowledge and skills in biotechnology, professional practical capability, and adaptability to the working environment. Students are also required to achieve a foreign language proficiency of level 3 at least, according to the 6-level Foreign Language Competency Framework for Vietnam. Upon graduation, students have gained the solid fundamental and specialised knowledge, high creativity, the ability to understand and explain the fundamental principles and various processes of biotechnology, the capability of conducting scientific research, and the ability to comprehend and apply new, advanced scientific achievements to professional practice.

3. Admission Information

According to regulations of VNU and approved annual admission scheme and quota.

PART II: EXPECTED LEARNING OUTCOMES OF THE PROGRAMME

1. Knowledge

ELO1.1. General knowledge (required by VNU and VNU-HUS):

- Understand and apply general, basic knowledge of social sciences, politics, laws, and culture in life and future jobs.

- Gain and apply knowledge of a foreign language in communication and professional work; achieve the proficiency of level 3 according to the 6-level Foreign Language Competency Framework for Vietnam.

- Understand and apply the core knowledge of basic science as a theoretical and practical foundation in professional development and creative ability.

- Understand and apply the knowledge of information technology in the process of learning and scientific research; gain broad background knowledge for adaptability to the Fourth Industrial Revolution.

ELO1.2. Knowledge of related natural sciences:

- Understand and apply basic knowledge in various fields of natural sciences, such as mathematics, physics, chemistry, to have foundation to acquire the knowledge of life sciences and biotechnology.

ELO1.3. Basic knowledge of life sciences and biotechnology:

- Understand and apply the basic knowledge of life sciences and biotechnology in order to acquire knowledge in specialised directions in biotechnology.

ELO1.4. Specialised knowledge of biotechnology:

- Understand and apply the theoretical and practical knowledge of the biotechnology to form ideas, build, organise, implement and evaluate techniques, methods, and projects in the field of biotechnology.

2. Skills

ELO2.1. Practical and problem-solving skills: Having the practical skills to carry out complex jobs that require application of theoretical and practical knowledge of biotechnology in different contexts; skills in identifying and solving problems in biotechnology.

ELO2.2. Critical and creative thinking skills: Having critical reasoning skills and positive thinking.

ELO2.3. Self-study and self-motivation skills: Having the skills in self-study to explore new knowledge for life-long learning; having the skills in setting personal goals and self-motivation.

ELO2.4. Communication skills: Having confident and effective communication skills; being able to coherently present ideas and perceptions.

ELO2.5. Teamwork skills: Having the skills in teamwork and the ability to cooperate with team members.

ELO2.6. English skills: Having basic English skills (listening, speaking, reading, and writing) of level 3 at least, according to the 6-level Foreign Language Competency Framework for Vietnam.

3. Attitudes and ethics

ELO3.1. Personal moral qualities and attitudes: Having good moral qualities, politeness, humility, enthusiasm, integrity, justice.

ELO3.2. Professional ethics: Being able to understand and adhere to professional ethics (honesty, responsibility, trustworthiness); having a passion for life sciences and biotechnology.

ELO3.3. Social attitudes: Having a sense of social responsibility, respect for people's rights, respect for the country's sovereignty.

*** Job opportunities that students can take after graduation**

Graduates of the BSc Biotech programme can:

- teach in field of biotechnology, and also in field of agriculture, forestry, fisheries, medicine, pharmacy, etc. at universities in Vietnam.

- do research in biotechnology and the related fields of biotechnology, e.g., experimental biology, genetics, microbiology, biomedicine at research institutes and agencies of respective ministries.

- work in the administrative agencies related to biotechnology of respective ministries, or in domestic and foreign industrial, production facilities, or work in local government agencies (provinces and cities) as specialist staff for biotechnology.

**** Ability to study and improve the personal and professional capability after graduation**

Graduates of the BSc Biotech programme can also continue with higher education programmes, and take many study opportunities in Vietnam and abroad.

PART III: PROGRAMME STRUCTURE

1. Summary of programme curriculum requirements

Total credits for graduation	**131 credits**
*(Excluding Physical Education, National Defence Education)***:**	
- General courses (required by VNU)	**16 credits**
(Excluding Physical Education, National Defence Education)	
- General courses (required by VNU-HUS)**:**	**7 credits**
+ *Compulsory course:*	*2 credits*
+ *Elective courses:*	*5/15 credits*
- Courses on related natural sciences:	**28 credits**
+ *Compulsory courses:*	*26 credits*
+ *Elective courses:*	*2 credits*
- Basic courses on life sciences and biotechnology:	***43* credits**

+ Compulsory courses: *29 credits*

+ Elective courses: *14 credits*

- Specialised courses on biotechnology: **37 credits**

+ Compulsory courses: *21 credits*

+ Elective courses: *9 credits*

+ Graduation thesis/ elective courses as alternative to graduation thesis: *7 credits*

2. Programme curriculum

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
I		**General courses** (required by VNU) *(Excluding Physical Education, National Defense Education and Complementary skills)*	**16**				
1	PHI1006	Marxist - Leninist Philosophy	3	30	15	0	
2	PEC1008	Marxist - Leninist Political Economy	2	20	10	0	PHI1006
3	PHI1002	Scientific socialism	2	30	0	0	
4	HIS1001	History of the Communist Party of Vietnam	2	20	10	0	
5	POL1001	Ho Chi Minh's Ideology	2	20	10	0	PHI1005
6	FLF1107	English B1	5	20	35	20	
7		Physical Education	4				
8		National Defence Education	8				
II		**General courses** (required by VNU-HUS)	**7**				
II.1		***Compulsory courses***	***2***				
9	INM1000	Introduction to Informatics	2	15	15	0	
II.2		***Elective courses***	***5/15***				
10	HIS1056	Fundamentals of Vietnamese	3	42	3	0	

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
		Culture					
11	GEO1050	Earth and Life Sciences	3	42	3	0	
12	THL1057	General State and Law	2	20	5	5	
13	PHY1070	Introduction to Internet of Things	2	24	6	0	
14	MAT1060	Introduction to Data Analysis	2	20	10	0	
15	PHY1020	Introduction to Robotics	3	30	10	5	
III		**Courses on related natural sciences**	**28**				
III.1		***Compulsory courses***	***26***				
16	MAT1090	Linear Algebra	3	30	15	0	
17	MAT1091	Calculus 1	3	30	15	0	
18	MAT1192	Calculus 2	2	20	10	0	
19	MAT1101	Probability and Statistics	3	27	18	0	MAT1091
20	PHY1100	Mechanics - Thermodynamics	3	30	15	0	MAT1091
21	PHY1103	Electromagnetism - Optics	3	30	15	0	PHY1100
22	CHE1080	General Chemistry	3	42	0	3	
23	CHE1081	Organic Chemistry	3	35	10	0	CHE1080
24	CHE1057	Analytical Chemistry	3	42	0	3	CHE1080
III.2		***Elective courses***	***2/6***				
25	CHE1069	General Chemistry Lab	2	0	30	0	CHE1080
26	CHE1058	Analytical chemistry Lab	2	0	30	0	CHE 1052
27	PHY1104	General Physics Practice	2	0	30	0	PHY1100 PHY1103
IV		**Basic courses on life sciences and biotechnology**	**43**				
IV.1		***Compulsory courses***	***29***				
28	BIO2100	Research methodology in Life Science	3	39	0	6	BIO2201 BIO3253
29	BIO2045	Scientific English in Biology	2	20	10	0	FLF2102

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
30	BIO2058	Cell Biology	3	25	15	5	
31	BIO2202	Biochemistry	3	25	15	5	BIO2058 BIO2204
32	BIO2203	Genetics	3	27	15	3	BIO2058 BIO2202
33	BIO2201	Molecular Biology	3	25	15	5	BIO2058 BIO2202
34	BIO2204	Microbiology	3	27	15	3	BIO2202
35	BIO2218	Biostatistics	3	20	25	0	MAT1192 MAT1101
36	BIO2206	Human and Animal Physiology	3	25	15	5	BIO2202
37	BIO2088	Developmental Biology	3	27	15	3	BIO2201 BIO2206
IV.2		***Elective courses***	***14/37***				
38	BIO2005	Biophysics	3	27	15	3	BIO2058
39	BIO2222	Proteomics and Structural Biology	3	30	10	5	BIO2201 BIO2202
40	BIO2215	Molecular Immunology	3	27	15	3	BIO2202 BIO2204
41	BIO2216	Basic Virology	3	35	5	5	
42	BIO2219	Industrial internship	2	5	25	0	BIO2203 BIO2204
43	BIO2223	Biological Field Studies	2	5	25	0	BIO3305 BIO3307

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
44	BIO3252	Human Biology	3	30	10	5	BIO2058 BIO2206
45	BIO3253	Basic Ecology	3	25	15	5	BIO3305 BIO3306 BIO3307
46	BIO2221	Evolutionary Biology	3	30	10	5	BIO2203
47	BIO3704	Experimental Ecology	3	30	10	5	BIO3253
48	BIO3278	Principles of Conservation Biology	3	30	10	5	BIO3305 BIO3307
49	BIO3244	General Parasitology	3	30	10	5	BIO3306
50	BIO3238	Management of Reserves and Wild Animal Protection	3	30	10	5	
V		**Specialised courses on biotechnology**	**37**				
V.1		***Compulsory courses***	***21***				
51	BIO3300	General Technics in Biotechnology	3	27	15	3	
52	BIO2220	Bioinformatics	3	30	10	5	BIO2202 BIO2201
53	BIO3302	Introduction to Biotechnology	3	25	15	5	BIO2201 BIO2203
54	BIO3303	Functional Biology of Plants	3	27	15	3	BIO2058
55	BIO3304	Genetic Engineering	3	27	15	3	BIO2202 BIO2203 BIO2204
56	BIO3305	Plant Systematics	2	20	7	3	BIO2058
57	BIO3306	Invertebrates Systematics	2	20	7	3	

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
58	BIO3307	Vertebrates Systematics	2	20	7	3	
V.2		***Elective courses***	***9***				
V.2.1		***Specialised courses on genetics and genetic engineering***	*9/18*				
59	BIO3314	Microbial Genetics	3	30	10	5	BIO2203 BIO2204
60	BIO3328	Population Genetics	3	40	0	5	BIO2203
61	BIO3311	Cancer Genetics	3	30	10	5	BIO2058 BIO2202
62	BIO3804	Pharmaceutical Biotechnology	3	30	10	5	BIO2202 BIO2203
63	BIO3309	Protein Enzyme Technology	3	30	10	5	BIO2202
64	BIO3440	Medical Genetics	3	30	10	5	BIO2203
V.2.2		***Specialised courses on microbiology and fermentation technology***	*9/15*				
65	BIO3313	Microbiology and Environmental Remediation	3	30	10	5	BIO2204
66	BIO3438	Principle in Genetic engineering of Microorganisms	3	30	10	5	BIO2203 BIO2204 BIO2202
67	BIO3315	Vaccine Biotechnology	3	30	10	5	BIO2201 BIO2204
68	BIO3316	Food Microbiology	3	30	10	5	BIO2204 BIO2202
69	BIO3439	Basic technology of fermentation	3	30	10	5	BIO2204 BIO2202
V.2.3		***Specialised courses on biochemistry and protein-***	*9/12*				

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
		enzyme technology					
70	BIO3344	Biochemistry of Food Processing	3	30	10	5	BIO2202 BIO2204
71	BIO3309	Protein Enzyme Technology	3	30	10	5	BIO2202
72	BIO3320	Plant Cell and Tissue Technology	3	30	10	5	BIO2201 BIO3303
73	BIO3210	Biochemistry of Bioactive Compounds	3	30	10	5	BIO2202 BIO2204
V.2.4		***Specialised courses on cell technology***	*9/12*				
74	BIO3320	Plant Cell and Tissue Technology	3	30	10	5	BIO2201 BIO3303
75	BIO3289	Animal Biotechnology	3	25	15	5	BIO2058 BIO2201
76	BIO3326	Stem Cell Technology	3	20	20	5	BIO2201 BIO2203 BIO2058
77	BIO3703	Tumour Biology	3	30	10	5	BIO2201 BIO2203 BIO2058
V.2.5		***Specialised courses on biomedicine***	*9/30*				
78	BIO3329	Molecular Basis of Diseases	3	40	0	5	BIO2204 BIO2202
79	BIO3330	Medical Microbiology	3	40	0	5	BIO2058 BIO2202 BIO2204
80	BIO3331	Medical Zoology	3	40	0	5	BIO3306
81	BIO3703	Tumour Biology	3	30	10	5	BIO2201 BIO2058

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
							BIO2203
82	BIO3332	General Epigenetics	3	27	15	3	BIO2201 BIO2203 BIO2204
83	BIO3249	Basic Neurobiology	3	30	10	5	BIO2058 BIO2202 BIO2206
84	BIO3220	Basic Endocrinology	3	30	10	5	BIO2206
85	BIO3222	Human Molecular Biology	3	25	15	5	BIO2201 BIO3252
86	BIO3437	Immune Disorder and Therapy	3	30	10	5	BIO2058 BIO2201 BIO2215
87	BIO3453	Essentials of Cardiovascular Physiology	3	40	0	5	BIO2206
V.2.6		***Specialised courses on biodiversity and conservation biology***	*9/36*				
88	BIO3239	Morphological Evolution of Angiosperm	3	30	10	5	BIO3305
89	BIO3240	Ecological Bases of Plants	3	30	10	5	BIO3305
90	BIO3225	Botanical Nomenclature	3	40	0	5	BIO3305
91	BIO3228	General Entomology	3	30	10	5	BIO3306
92	BIO3241	General Hydrobiology	3	30	10	5	BIO3306
93	BIO3810	Medical Invertebrates	3	30	10	5	BIO3306
94	BIO3811	Biogeography	3	30	10	5	BIO3307 BIO3306 BIO3305

No	Course code	Course name	Credits	Credit hours			Prerequisite courses
				Lecture	*Practice*	*Self-study*	
95	BIO3452	Research Methods for Fish	3	30	10	5	BIO3307
96	BIO3231	Biology and Ecology of Vertebrates	3	40	0	5	BIO3307
97	BIO3290	Ecosystem Management	3	30	10	5	BIO3205
98	BIO3705	Environment and Sustainable Development	3	30	10	5	BIO3234
99	BIO3234	Environmental Ecology	3	40	0	5	BIO3306 BIO3305
V.3		***Graduation thesis/elective courses as alternative to graduation thesis***	***7***				
V.3.1		*Graduation Thesis*	*7*				
100	BIO4073	Graduation Thesis	*7*				
V.3.2		*Elective courses as alternative to graduation thesis*	*7/14*				
101	BIO3706	Cells and Organisms	3	30	10	5	BIO2058
102	BIO3707	Organisms and Population	3	30	10	5	BIO2058
103	BIO3245	Genetic Markers and Individual Identity	2	15	10	5	BIO2058 BIO2201 BIO2203
104	BIO3246	Physiological bases of Microbiology	2	15	10	5	BIO2204
105	BIO3177	Bioenergy	2	24	6	0	BIO2202
106	BIO2805	Histology	2	20	10	0	BIO2058 BIO2207
		Total:	**131**				