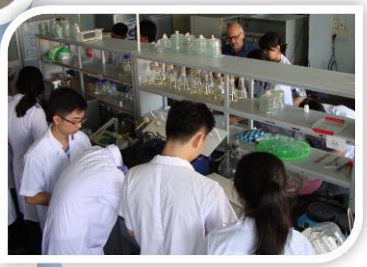
Can Tho University
Biotechnology Research and Development Institute

STUDENT'S HANDBOOK



Pictures in cover page:

Above: Graduation Ceremony for the first batch of the Advanced Biotechnology Program

Left photo: The team of the Advanced Biotechnology Program receiving the highest prize from the Academic Competition in Biotechnology in 2010

Right photo: Students of the Advanced Biotechnology Program in laboratory under supervision of Michigan University's expert.

Below photo: A typical lecture with professor from Michigan University for the Advanced Biotechnology Program

Center Photo: Student of the Advanced Biotechnology Program presenting at the International Conference.

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OVERVIEW

CANTHO UNIVERSITY

Established in 1966, Can Tho University (CTU) is an important public higher education institution and a cultural, scientific and technical center of the Mekong Delta Region and Viet Nam.

- **Vision**

CTU targets to be one of the leading higher education institutions in Viet Nam and recognized as one of the top universities in Asia-Pacific in training and research in 2022.

- **Mission**

CTU operates its resources to become the leading national center for training, scientific research and technology transfer, making significant contributions to the development of high quality human resources, fostering the talents and the advancement of science and technology to cater for the regional and national socio-economic development. Can Tho University is the crucial driving factor for the development of the Mekong Delta Region.

In particular, CTU takes on the duties to

1. train high quality human resources to serve the demands of society;
2. conduct scientific researches and transfer technology to solve practical problems in the Mekong Delta region (MDR);
3. function as the leader of the MDR in terms of international relations, global integration and applications of advance in science and technology; and
4. operate as the center to provide scientific and technological information as well as experts and theoretical bases to the region.

Biotechnology Research and Development Institute (BiRDI)

➢ **Mission**

Consistent with the mission of CTU, BiRDI has to fulfill the following mission tasks:

- train highly qualified human resources specializing in Biotechnology in order to meet the skilled labor demands of the society;
- conduct scientific researches and transfer technology to support optimal solutions to practical biotechnology problems in the MDR; and
- become the focal point linking CTU with other research centers in the MDR for efficient cooperation in Biotechnology which facilitates development in advanced technology among partners and stakeholders in the MDR and around the world.

➢ **Objectives:**

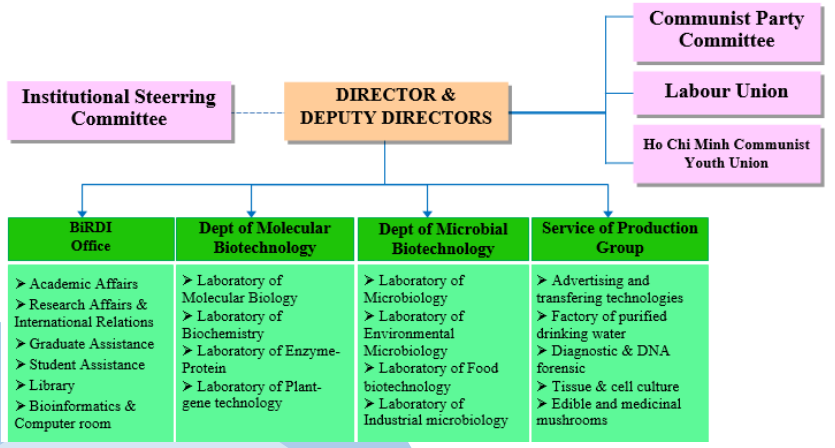
- Integrate activities in scientific research, training and technology transfer on Biotechnology meeting to the requirements of production in the Mekong Delta.
- Establish and expand research projects on Biotechnology relating to problems in the Mekong Delta. In order to serve scientific research and technology transfer, BiRDI is actively seeking and effectively developing the budget supported by the government and provincial collaborations, companies and international cooperation.
- Offer BSc. and MSc. in Biotechnology and PhD-Microbiology program.
- Take a part in training for undergraduate and graduate students from CTU as well as from other colleges/schools in the Mekong Delta, conducting experiments for their theses at BiRDI, using the facilities and under the guidance of BiRDI staffs, offering the advanced BSc course in Biotechnology.
- Do research and transfer the technology relating to Biotechnology.
- Transfer new developed technology to improve traditional processes and to develop advanced technology serving

economic and social development, emerging to regional and international market.

- Manage and improve quality of products in the Mekong Delta in molecular level for microorganisms, plants, animals, post-harvest technology, foods and environment. It is the scientific markers for product certification in nationwide and international.
- Manage and exploit effectively facilities of BiRDI, use in effectiveness the investment of central and local government, international organizations and with enthusiastic effort of staff members, BiRDI has developed the human resource, upgraded the facilities, transfer high technologies and trained staff with advanced knowledge of Biotechnology.

➢ **Organization of BiRDI:**

ORGANIZATIONAL STRUCTURE OF BIRDI



*BiRDI has 48 members including regular staff or long-term contractors, including 1 professors, 6 associate professors, 4 doctors, 17 masters (9 is now PhD students), 9 bachelors (one is studying master degree) and other levels.

***Board of Directors:** One Director for general management; one Vice Director for permanent management in production and

finance; one Vice Director responsible for research and international relations. Institutional Steering Committee includes Board of Directors, Head of Dept., Agent of Party, Labor union, Youth Union. Unions: Communist Party Committee, Labor Union and Ho Chi Minh Communist Youth Union.

***Office:** responsible for direct management, operation and assistance of all BiRDI activities following the instructions of the Board of Directors, with 6 different groups being included: Academic Affairs, Research Affairs and International Relations, Graduate Assistance, Student Assistance, Library, Bioinformatics and Computer room.

Microbial Biotechnology Department: undertakes the researching activities, provides courses and supervises students on their scientific research or graduation thesis in the field of Microbiology, including: Laboratory of Microbiology, Laboratory of Environmental Microbiology, Laboratory of Food biotechnology, and Laboratory of Industrial microbiology.

Molecular Biotechnology Department: in charge of researching, teaching, supervising students on their scientific research or graduation thesis related to the field of Molecular Biotechnology, including: Laboratory of Molecular Biology, Laboratory of Biochemistry, Laboratory of Enzyme-Protein, Laboratory of Plant-gene technology.

***Service of Production Group:** responsible for advertising and transferring technology, applying achievements from studying activities of BiRDI to pilot and practical production not only to test the feasibility and effectiveness of what have been achieved but also to benefit the society and contribute a small profit for BiRDI, currently including: Advertising and transferring technologies, Factory of purified drinking water, Diagnostic & DNA forensic, Tissue & cell culture, and Edible and medicinal mushrooms.

ADVANCED PROGRAM IN BIOTECNONOLOGY

➢ **Overview**

The Program has been offered since 2006 based on Decision No. 6666/QĐ-BGD&DT of the MOET. The courses are offered in English. The Program specification is formulated and informed to stakeholders via the websites in both Vietnamese and English (http://birdi.ctu.edu.vn/birdi_cttt/ http://websrv.ctu.edu.vn/). The Program is taught fully in English by the lecturers of CTU (mainly from BiRDI and some from the College of Natural Sciences). This program is also taught by visiting lecturers from MSU and famous partner universities such as Brussels University (Belgium), Wageningen University (the Netherlands), Copenhagen University (Denmark), Cornell University (the USA), New South Wales University (Australia)...

+ Name of the program: Bachelor of Biotechnology (Advanced Program).
+ Mode of study: Full time, regular
+ Training time: 4.5 years *(including 1 semester for Intensive English with 20 credits)*
+ Qualifications: Bachelor Degree of Biotechnology (by CTU) and Certificate of Completion of Advanced Program in Biotechnology (by MSU).

* Criteria to choose students for Advanced Biotechnology program: The students have to fulfill 2 criteria:
+passing the national university entrance examination for Band A (Mathematics, Physics, Chemistry) or Band B (Mathematics, Chemistry, Biology); and
+passing the English institutional examination organized by CTU (the students must attend intensive English courses to improve English proficiency after admission).

➢ **Objectives of BiRDI with the Bachelor of Biotechnology program**

The objectives of the Advanced Program in Biotechnology include:

- helping the students construct generic and biotechnology-specialized knowledge to work effectively in state-owned and private-owned industries
- rooting ethical motivation among the students
- formulating English capacity among the students to help them work effectively in a global biotechnology context
- nurturing lifelong learning among the students to help them maintain and enhance their professional knowledge and skills and be able to adapt to changes
- generating high-quality human resources for academic and research activities in the field of biotechnology in the MDR

➢ **Opportunities for jobs and promotion in:**

- International and domestic companies invoved in Biotechnological production and trading;
- Univerisities , reasearch institutes with mandate in modern Biotechnology rearsch;
- Organizations, agencies for food services, food quality and safety management, evironmental and public health.
- Government agencies for industrial biotechnology and intellectual property management;
- Graduate education overseas.

➢ **Learning Outcomes:**

The graduates from the Advanced Program in Biotechnology will be able to:

1. apply the generic knowledge of social and humanity science and natural science to the professional activities to increase work performance;
2. analyze the specialized knowledge in biotechnology for effective applications in professional work to achieve better work performance;
3. select and enhance the use of techniques, skills, and up-to-date technological tools necessary for biotechnology practices in reality; design and conduct experiments to arrive at solutions to improve work performance;
4. conduct various activities to design, organize, manage and operate production facilities in biotechnology;

5. analyze the demands and mobile all resources available to design processes to help organize, manage and operate biotechnology activities (namely the production of new plant and animal varieties, new microorganisms; microbiological products, techniques…);
6. identify and compare work issues to come up with solutions to problems in biotechnology and be able to create a service business;
7. apply effective skills in communication to exchange and sharing information in collaboration to develop biotechnology; develop leadership, teamwork and soft skills for employment and promotion;
8. construct life-long learning as a personal skill and consciousness and integrate study and research in daily work to be ready for national and international research relations; and
9. protect and improve personal health, fulfill civic responsibility, abide by the laws, be insightful on contemporary political and social issues, and contribute to sustainable development of the biotechnology area, the environment, and the society.

- **Program Specification:**

The curriculum is designed based on the program specification and documents from the MOET, the credit-based training system and relevant regulations. More importantly, the curriculum is mostly based on the program offered by MSU in the USA, taking into consideration references to well-known universities such as Wageningen University, and especially making use of the support from cooperative programs with foreign countries such as the MHO7 of the Netherlands, and VLIR program of Belgium.

The total number of credits is 151 with the following knowledge block weights:

Knowledge Blocks	Credits required	Percents (%)
General	56	**37.1**
Fundamental	46	**30.4**
Professional Core	20	**13.2**
Professional Elective	19	**12.6**
Thesis	10	**6.7**
Total	**151**	**100**

1. Curriculum

No.	Code	Courses	Credits	Require credits	Elective credits	Prerequisite Course
I. General Knowledge			**56**	**54**	**2**	
1	QP001	National Defense Education *(*)*	6	6		
2	TC100	Physical Education (*)	2		2	
3	ML009	Basic Principles of Marxist-Leninism 1	2	2		
4	ML010	Basic Principles of Marxist-Leninism 2	3	3		ML009
5	ML006	Ho Chi Minh's Ideology	2	2		ML010
6	ML011	Revolution line of Vietnamese Communist Party	3	3		ML006
7	EN101C	Advanced English I	3	3		
8	EN102C	(Advanced English II	3	3		EN101C
9	EN103C	Writing: Sciences & Technology	3	3		EN102C
10	BS110C	Cells and Molecules I	3	3		
11	BS210C	Cells and Molecules Lab.I	1	1		
12	CH141C	General Chemistry I	3	3		
13	CH161C	General Chemistry Lab I	1	1		
14	CH142C	General and Inorganic	3	3		CH141C

No.	Code	Courses	Credits	Require credits	Elective credits	Prerequisite Course
		Chemistry II				
15	CH162C	General and Inorganic Chemistry Lab II	1	1		CH161C
16	CS101C	Computer Science	1	1		
17	CS201C	Computer Science Lab	2	2		
18	MT132C	(Calculus I – II	6	6		
19	PH183C	Physics for Scientists and Engineers I	4	4		
20	PH184C	Physics for Scientists and Engineers II	4	4		PH183C
II. Fundamental Knowledge			**46**	**46**	**0**	
21	BS111C	Organism and Populations	3	3		BS110C
22	BS211C	Organism and Populations Lab. II	1	1		BS210C
23	CH251C	Organic Chemistry I	3	3		
24	CH352C	Organic Chemistry II	3	3		CH251C
25	CH355C	Organic Chemistry Lab	2	2		CH251C
26	MI301C	Introductory Microbiology	3	3		BS111C
27	MI302C	Introductory Microbiology Lab	1	1		BS211C
28	BC461C	Biochemistry I	3	3		CH352C
29	BC471C	Biochemistry Laboratory I	2	2		CH355C
30	BC462C	Biochemistry II	3	3		BC461C

No.	Code	Courses	Credits	Require credits	Elective credits	Prerequisite Course
31	BC472C	Biochemistry Laboratory II	2	2		BC471C
32	ZO341C	Fundamental Genetics	3	3		BS111C
33	ZO342C	Fundamental Genetics Lab	1	1		
34	BT199C	Biotechnology Seminar I	1	1		
35	BT198C	Biotechnology Seminar II	1	1		BT199C
36	BT197C	Biotechnology Seminar III	1	1		BT198C
37	BT298C	Biotechnology Seminar IV	2	2		BT197C
38	BT299C	Biotechnology Seminar V	2	2		BT298C
39	BT300C	Research Methods	2	2		
40	CS464C	Statistics for Biologists	3	3		CS001
41	BT303C	Bio-Informatics	3	3		CS002, BB801C
42	BT200C	Field trip	1	1		
III. Professional Knowledge			**64**	**20**	**19**	
43	BT201C	Introduction Biotechnology	2	2		
44	MM445C	Basic Biotechnology	4	4		BT201C
45	BB801C	Molecular Biology	3	3		BC462C
46	BB802C	Molecular Biology Lab.	1	1		
47	BT301C	Genomics and Its Application	3	3		BB801C
48	BT302C	Genomics and Its Application Lab.	1	1		BB802C

No.	Code	Courses	Credits	Require credits	Elective credits	Prerequisite Course
49	BT480C	Practical Training in Industry	3	3		
50	MM433C	Microbial Genomics	2	2		BB801C
51	MM434C	Microbial Genomics Lab.	1	1		BB802C
52	MM413C	Virology	2		19	MI301C
53	MM414C	Virology Lab.	1			MI302C
54	BT306C	Proteomics	3			BC462C
55	BT406C	Proteomics Lab.	1			
56	BT304C	Food Fermentation	2			MI301C
57	BT404C	Food Fermentation Lab.	1			MI302C
58	CS344C	Food Biochemistry	2			BC462C
59	CS345C	Food Biochemistry Lab.	1			BC472C
60	FS440C	Food Microbiology	2			MI301C
61	FS441C	Food Microbiology Lab.	1			MI302C
62	AN407C	Food and Animal Toxicology	3			MI301C
63	BT307C	Social and Economical Aspects of Biotechnology	2			
64	CS072C	Animal Physiology	2			BS111C
65	CS073C	Animal	1			

No.	Code	Courses	Credits	Require credits	Elective credits	Prerequisite Course
		Physiology Lab.				
66	CS443C	Aquaculture Biotechnology	2			BB801C
67	CS444C	Aquaculture Biotechnology Lab	1			
68	ZO892C	Biodiversity	2			BS111C
69	BT305C	Plant Tissue Culture	2			
70	BT405C	Plant Tissue Culture Lab.	1			
71	CS441C	Plant Breeding and Biotechnology	2			BB801C
72	CS442C	Plant Breeding and Biotechnology Lab.	1			
73	CS465C	Plant Physiology	2			BS111C
74	CS466C	Plant Physiology Lab.	1			
75	HR486C	Biotechnology in Agriculture: Application and Ethical Issues	3			
76	BB856C	Plant Molecular Biology	2			BB801C
77	BB857C	Plant Molecular Biology Lab	1			BB802C
IV. Thesis			**10**	**10**	**0**	
78	BT499C	Graduate Thesis	10	10	0	
Total: 151 credits (130 Require credits and 21 Elective credits)				**130**	**21**	

2. Structure of the curriculum

Knowledge Block	Number of Courses	Credits required	Block weight (%)
General Knowledge	11	29	**37.1**
Political Education	4	10	
National Defense Education	1	6	
Physical Training	2	2	
Advanced English	3	9	
Fundamental Knowledge			**30.4**
Basic: 1. Fundamental Genetics 2. Introductory Microbiology 3. Organism and Populations 4. Organic Chemistry 5. Biochemistry	**13**	30	
Advanced: 6. Statistics for Biologists 7. Research Methods 8. Biotechnology Seminar 9. Bio-Informatics 10. Field trip	**9**	16	
Professional Knowledge			
Core: 1. Introduction Biotechnology 2. Basic Biotechnology 3. Molecular Biology 4. Genomics and Its Application 5. Microbial Genomics 6. Practical Training in Industry	9	20	**13.2**

*Elective (students have to select **19 credits**)* 1. Plant Tissue Culture 2. Proteomics 3. Food Fermentation 4. Plant Breeding and Biotechnology (2) 5. Aquaculture Biotechnology 6. Biodiversity 7. Plant Physiology 8. Animal Physiology 9. Food Biochemistry 10. Food Microbiology 11. Virology 12. Food and Animal Toxicology 13. Biotechnology in Agriculture 14. Plant Molecular Biology 15. Social and Economical Aspects of Biotechnology	24	19	**12.6**
Thesis	**1**	10	**6.7**
Total*	**77**	**151**	**100**

3. Curriculum Distribution

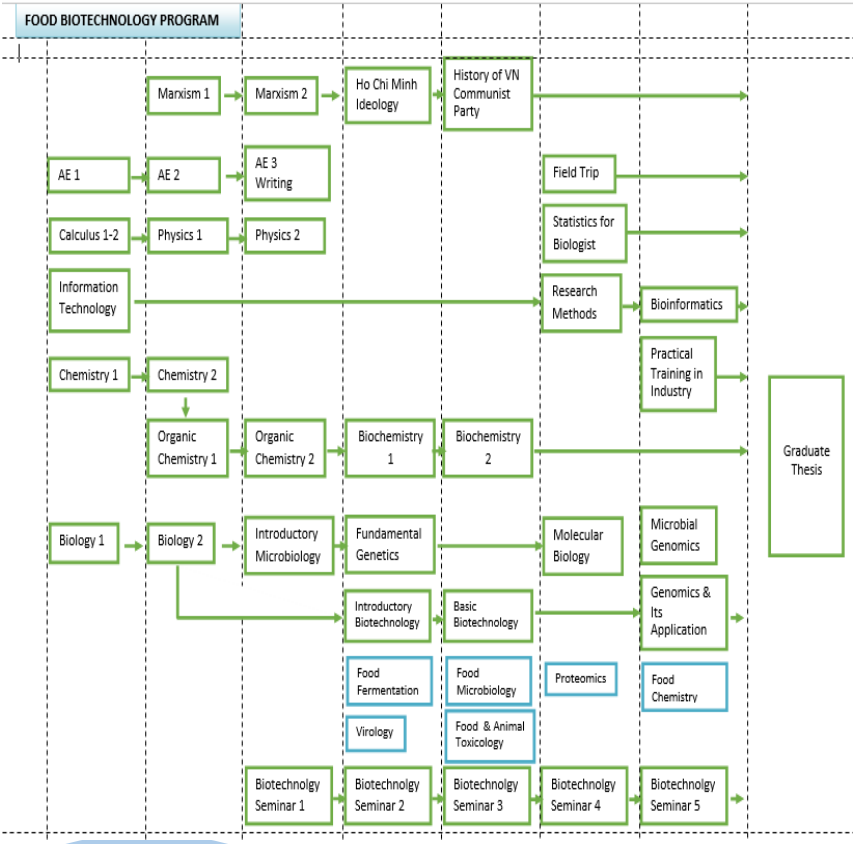
INTENSIVE ENGLISH PROGRAM: 20 credits					
FRESHMAN: 46 credits					
Semester 1			***Semester 2***		
Code	**Courses**	**Credit**	**Code**	**Courses**	**Credit**
BS110C	Cells and Molecules I	3	ML009	Principles of Marxism 1	2
BS210C	Cells and Molecules Lab.I	1	BS 111C	Organism and populations	3
CH141C	General Chemistry I	3	BS211C	Organism and Populations Lab.II	1
CH161C	Chemistry Lab.I	1	CH142C	General and Inorganic Chemistry	3
EN101C	Advanced English I	3	CH162C	Chemistry Lab. II	1
MT132C	Calculus I-II	6	EN102C	Advanced English II	3
CS001	Basic Informatics	2	PH183C	Physics for Scientists and Engineers I	4
CS002	Basic Informatics Lab	1	CH251C	Organic chemistry I	3
Total credits		**20**	*Total credits*		**20**
Summer semester					
QP001	National Defense Education	**6**			
SOPHOMORE: 42 credits					
Semester 1			***Semester 2***		
Code	**Courses**	**Credit**	**Code**	**Courses**	**Credit**
ML010	Principles of Marxism 2	3	ML006	Ho Chi Minh's Ideology	2
MI301C	Introductory Microbiology	3	ZO341C	Fundamental Genetics	3
MI302C	Introductory	1	ZO342C	Fundamental	1

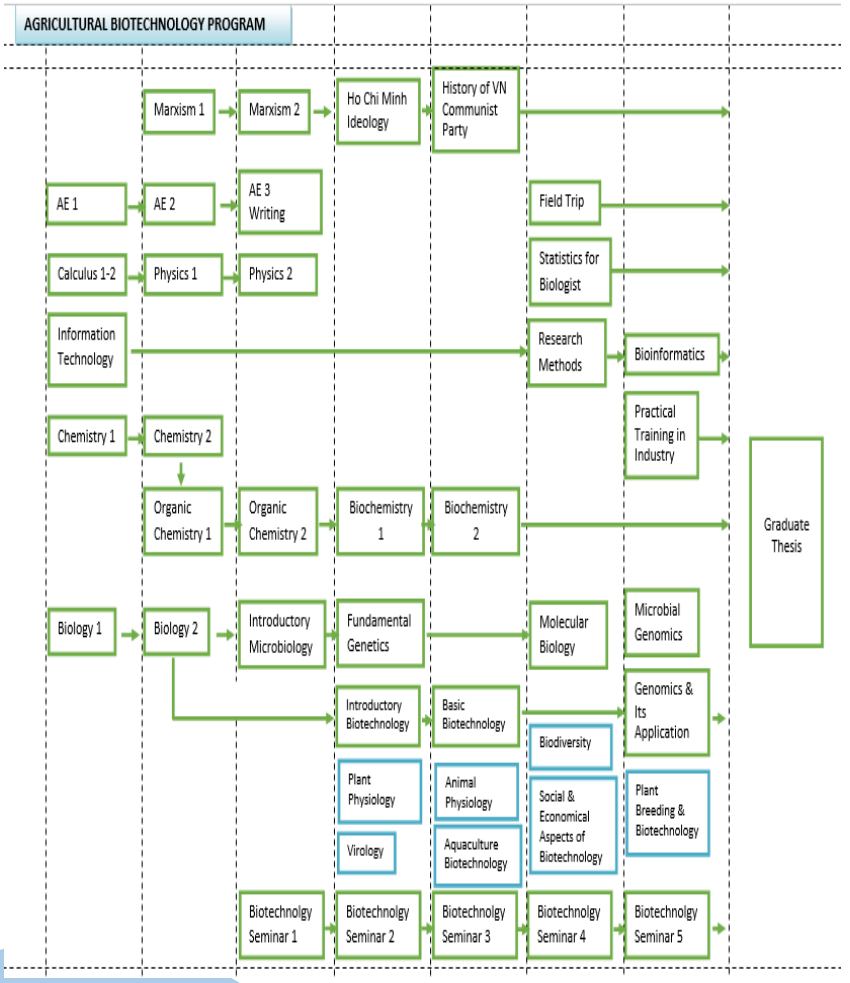
	Microbiology Lab			Genetics Lab	
BT199C	Biotechnology Seminar I	1	BT198C	Biotechnology Seminar II	1
EN103C	Writing: Sciences & Technology	3	BT201C	Introductory Biotechnology	2
PH184C	Physics for Scientists and Engineers II	4	BC461C	Biochemistry I	3
CH352C	Organic chemistry II	3	BC471C	Biochemistry I Lab	2
CH355C	Organic chemistry Lab	2	Elective Courses : 6 credits		
			BT304C	Food Fermentation	2
			BT404C	Food Fermentation Lab	1
			MM413C	Virology	2
			MM414C	Virology Lab.	1
			CS465C	Plant physiology	2
			CS466C	Plant physiology Lab.	1
Total credits		**20**	*Total credits*		**20**
Summer semester					
TC100	Physical Training	**2**			
JUNIOR: 35 credits					
Semester 1			***Semester 2***		
Code	**Courses**	**Credit**	**Code**	**Courses**	**Credit**
ML011	History of Viet Namese Communist Party	3	BT298C	Biotechnology Seminar IV	2
BT197C	Biotechnology Seminar III)	1	BT300C	Research Methods	2
MM445C	Basic Biotechnology)	4	BT200C	Field trip	1

BC462C	Biochemistry II	3	BB801C	Molecular Biology	3
BC472C	Biochemistry II Lab.	2	BB802C	Molecular Biology Lab.	1
			CS464C	Statistics for Biologists	3
Elective Courses : 6 credits			Elective Courses : 4 credits		
FS440C	Food Microbiology	2	BT306C	Proteomics	2
FS441C	Food Microbiology Lab.	1	BT406C	Proteomics Lab.	2
AN407C	Food and Animal Toxicology	3	BT307C	Biodiversity	2
CS072C	Animal physiology	2	ZO892C	Social and Economical Aspects of Biotechnology	2
CS073C	Animal physiology Lab	1			
CS443C	Aquaculture Biotehnology	2			
CS444C	Aquaculture Biotehnology lab.	1			
Total credits		**19**	*Total credits*		**16**
SENIOR: 28 credits					
Semester 1			***Semester 2***		
Code	**Courses**	**Credit**	**Code**	**Courses**	**Credit**
BT299C	Biotechnology Seminar V	2	BT499C	Graduate Thesis	10
MM433C	Microbial Genomics	2			
MM434C	Microbial Genomics	1			
BT301C	Genomics and its application	3			
BT302C	Genomics and its application Lab.	1			
BT303C	Bio-Informatics	3			
BT480C	Practical training in industry	3			

Elective Courses : 3 credits					
CS344C	Food Biochemistry	2			
CS345C	Food Biochemistry Lab	1			
CS441C	Plant Breeding and Biotechnology	2			
CS442C	Plant Breeding and Biotechnology Lab.	1			
BT305C	Plant and tissue culture	2			
BT405C	Plant and tissue culture Lab.	1			
HR486C	Biotechnology in Agriculture: Applications&Ethical Issues	1			
Total credits		**18**	*Total credits*		**10**
TOTAL: 151 credits					

4. Recommended Study Plan





Besides, students have to enroll the Intensive English Program (equivalent to **20** credits) at the first semester. The credits from this program are not included in the 151 total credits of the Advanced Program in Biotechnology.

The Intensive English Program specification is as follow:

No.	Course name	Course code	Number of Credit	Number of Contact hour	Number of Week
1	*Listening & Speaking*	AV001	5	75	8
2	*Pronunciation*	AV002	3	45	8
3	*Writing*	AV003	4	60	10
4	*Reading*	AV004	3	45	10
5	*Grammar*	AV005	3	45	10
6	*Presentation Skills*	AV006	2	30	10
			20	**300**	

Field trip:

This course is allowed to register for juniors.
1-week tour will be organized for students to observe activities, exchange information and have an idea about the practical situation of some typical institutions such as Research Institutes/factories/manufactories applying biotechnological achievements.

Practical Training in Industry/Biotech Institute:

This course is allowed to register for seniors and done in summer semester.
Students will practice during 4-6 weeks at factories (food, berverages); plant breeding gardens, institutions, biotechnology companies... to check what they have learned in the university and to accumulate knowledge and experiences. This course will acquaint students to participate in practical conditions of production industries in the fields of biotechnology, such as food processing factories, research institutes, plant and animal breeding units, bio-chemical factories, biotechnology companies, wastewater plants, pharmaceutical manufacturers… for studying, investigating, practicing and evaluating the practical production activities or scientific activities with the aim to check what they have learned in the university and to accumulate knowledge and experiences, to link theory studied at campus and practice the skills as well as accomplish the methods of administration and management at industries.

Thesis registration

Criteria:

- Sucessfully accumulate at least 100 credits of the academic curriculum with the grading point average (GPA) of above 2.25.
- Do not under any academic admonishment.

The graduation thesis has to be proposed and defended in English, and be qualified as a university research project involving:

- ✓ The student defends the thesis proposal, and he/she then corrects the proposal according to the scientific committee's feedbacks to get it approved by BiRDI;
- ✓ The student defends his/her thesis with the committee consisting of 3 members who have works/experiences in the thesis field of study selected by the BiRDI Director. The student presents his/her thesis in 15-20 minutes followed by questions and comments from the committee members. Minutes and evaluation forms of the three committee members are made during the defense. Thesis revision could be made under suggestions of the committee. Final score is given as average of the scores from the three committee members. The students have to submit their complete thesis in Vietnamese after taking the comments and a detailed summary of the thesis in English to BiRDI.

Graduation criteria

Students have to complete all of the following requirements for graduation:

- Sucessfully complete the academic curriculum (151 credits) with the grading point average (GPA) of above 2.00 ;
- Do not under any academic admonishment.
- Meet other requirements in accordance with the regulations for graduation set by the CTU.

To check the graduation of students, a graduation committee is formed. Normally, it consists of the Head of Department of Academic Affairs,

Head of Department of Students Asisstance, the Director of BiRDI and one Academic Secretary. The committee is also assisted by the Academic Secretary of BiRDI. The academic achievement of each student is carefully checked along with the requirements of the program. Course equivalences are also taken into account. Exceptional cases have to be approved by this committee.

Graduation classification depends on GPA:

Excellent	GPA from 3.60 to 4.00
Very Good	GPA from 3.20 to 3.59
Good	GPA from 2.50 to 3.19
Average	GPA from 2.00 to 2.49

Scholarship information

Each semester, top of students with highest GPA and good extracurricular activities in the semester will receive scholarship from CTU according to scholarship's fund provided for each class every year.
The proposals of scientific research made by students are also funded by CTU if they are qualified and approved by the Scientific Committee with particular scientific criteria. For researches belonged to the graduation thesis of Advanced Program in Biotechnology, CTU also supports a fund of 10,000,000 VND, approximately 500 USD for each student.
In addition, BiRDI has some certain supporting awards from volunteers to encourage poor and excellent students.

Course registration:

- Academic advisors are responsible for managing students, giving advice on constructing study plan and supporting students during their study process.
- At the beginning of each semester, CTU offers students with a list of opened courses and their schedule.
- All students except those who have just passed the university entrance exam must registered courses following the study plan before the new semester starting.
- The number of registered credits must be 8 at least and 20 in maximum for each main semester (less than 8-credit registration without

CTU'spermission is considered as dropping out). For senior students, if the number of unfinished credits in study plan are less than or equal to 25, they are allowed to register 25 credits in maximum).
- Registration in summer semester is optional. Eight credits in this semester is maximum.
- In the first semester for freshmen, studying courses are arranged by CTU staffs.
- All students who are academically admonished are allowed to register up to 14 credits in maximum.

*Course registration process:
- Step 1: Based on the study plan and the schedule of particular courses in each semester informed 6 weeks before registration time, students register online following the registration schedule of CTU.
- Step 2: From the second week of the semester, students have to print out the "Course registration results" which can be accessed from the CTU website (www.ctu.edu.vn).

During the first week of semester, students can delete or add more courses to replace those that cannot be opened. After this time, the registration results are fixed. Students can delete registered courses if they feel overloaded by the 8th week of semester. Deleted courses are graded W in the academic transcript at the end of that semester. In the main semester, the number of remaining credits after deleting should not be less than 8. After registration, if students do not attend class or final exam, such the courses are graded F.

Academic temporary absence

Academic temporary absence: Student may request an academic temporary absence in following situations:
- Joining military
- Sickness or accident which requires a long time to recover (with offical health confirmation)
- Personal situation, e.g.family difficulties. This case is considered appropriate if students have studied at least one semester and are not being in academic dismissal status and getGPA not less than 2.00. The

absence time in this situation will be counted for the total time of completing the program.
- If being permitted to leave, students will receive adecision for absence. When the absence time expires and/or at least 2 weeks before a new semester, students have to apply again to get the admission. If meeting all requirements, students will be admitted to continue their study.

Academic Warning

Any students who get GPA below 0.80 or does not enroll enough courses (at least 8 credits) in the main semester will receive the statement of "Academic warning".

Academic Suspension

Students violating one of the below regulation will be suspended academically for one year:
- Being punished at the level of academic suspension.
- getting weak band of extracurricular activities for thewhole academic year at the first time

Academic dismissal

Students violating one of the below regulation will be dismissed academically:
a. Being punished at the level of academic dismissal
b. Getting academic warning and gettingGPA below 1.00 in the following semester
c. Having absentperiod longer than the permitted time
d. Not enroll or enroll insufficient credits (at least 8 credits) without the CTU'spermission for 2 continuous main semesters (including the first semester of the program)
e. Not paying tuition fee for 2 continuous semesters
f. Getting weak band of extracurricular activitiesfor the whole academic year at the second time
g. Finishing the allowed time for training.

Information about academic warning and suspension is sent to student's family by post.

Grading system

The assessment results are expressed by a 4.0-point scale corresponding to the letter scale of A, B^+, B, C^+, C, D^+, D and F.

Category	10-point scale grade references	Letter-scale grade references	
		Description	Grade
Excellent	From 9.0 to 10.0	Demonstrates complete understanding of course. All requirements of task are included in response.	A
Very Good	From 8.0 to 8.9	Demonstrates considerable understanding of course. All requirements of task are included.	B+
Good	From 7.0 to 7.9	Demonstrates considerable understanding of course. All requirements of task are included.	B
Average	From 6.5 to 6.9	Demonstrates partial understanding of course. Most requirements of task are included.	C+
Fair	From 5.5 to 6.4	Demonstrates partial understanding of course. Most requirements of task are included.	C
Poor	From 5.0 to 5.4	Demonstrates little understanding of course. Many requirements of task are missing.	D+
Very poor	From 4.0 to 4.9	Demonstrates little understanding of course. Many requirements of task are missing.	D
Fail	Below 4.0	Demonstrates no understanding of course.	F

List of Academic Advisors

Advisor is in charge of students in years they spend in Advanced Biotechnology Program.

- ✓ Year 2006: Ngo Thi Phuong Dung
- ✓ Year 2007: Truong Trong Ngon
- ✓ Year 2008: Nguyen Huu Hiep
- ✓ Year 2009: Huynh Xuan Phong
- ✓ Year 2010: Tran Thi Xuan Mai
- ✓ Year 2011: Nguyen Dac Khoa
- ✓ Year 2012: Truong Trong Ngon
- ✓ Year 2013: Nguyen Huu Hiep

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COURSE DESCRIPTION

EN101: Advanced English I

3 credits

Prerequisites: Basic English skills in writing, speaking and reading.

This course aims to develop the students' competence in using the classroom English language. Students are also provided with grammar exercises, biotech- related readings, basic paragraph writing skills and presentation techniques.

EN102: Advanced English II

3 credits

Prerequisites: Advanced English I

The goal of this course is to improve students' ability to communicate in English. It aims to prepare students language contents, strategies and skills to read present, discuss, write an academic essay presenting and arguing about general and specific issue in science and technology.

EN103: Writing: Sciences & Technology

3 credits

Prerequisites: Advanced English II

The course is designed to provide students with strategies and practices of critical reading and critical writing about scientific issues. It includes a lot of reading tasks, presentation and discussion, as well as writing activities, which will help students to critically think about the readings as well as create and develop compositions in a critical way.

BS110: Cells and Molecules

3 credits

Prerequisites: none

This course is an introduction to biology at the cell level and below. Our goal is that by the end of the semester students will have learned the fundamentals of how cells function, an appreciation of the context of basic biomolecular processes: Overview of the Atoms, molecules; Macromolecules; Overview of Cell structure and function; Cell metabolism; Cell division.

BS210: Cells and Molecules Lab

1 credits

Prerequisites: none

Taking this course, students will be provided some basic skills in General Biology. The experiments being related to main concepts studied in General Biology

BS111: Organism and Populations

3 credits

Prerequisites: none

Main topics include the evolutionary processes and pattern, the diversity of plants and animals, and the ecology. The primary goals of the course are: 1) to provide students the concepts of organismal biology and ecology and 2) to prepare students for more advanced coursework and/or self-directed study in biology and biotechnology

BS211: Organism and Populations Lab

This course will help students develop problem-solving, writing, presentation and laboratory skills. Laboratory topics include evolution, organismic diversity, and ecology.

CH141: General Chemistry I

3 credits

Prerequisites: none

This course mainly focuses on conceptual and descriptive chemistry. The first part covers the atomic structure and shows how modern theory of atomic structure accounts for the periodicity in terms of the electron arrangements in atoms. Since the manner in which atoms are bound together has a strong effect on the chemical and physical properties, types of chemical bonding are then examined including ionic, covalent and intermolecular forces. The course also examines the chemical behavior of the representative elements and the coordination chemistry of the transition metals.

CH161: General Chemistry lab I

Experiments in general chemistry, stoichiometry, calorimetry, molecular geometry, kinetics, acids and bases and inorganic chemistry

CH142: General and Inorganic Chemistry II

3 credits

Prerequisites: General Chemistry I

The mole concept and stoichiometry; Solution stoichimertry; Thermochemistry;

Gases, liquids, and solids; Kinetics; Chemical equilibria; Acid – base equilibria;

Aqueous equilibria; Thermodynamics; Redox and electrochemistry.

CH162: General and Inorganic Chemistry lab II

Analytical and inorganic chemistry; Redox and acid base titrations; Spectrophotometric and gravimetric analysis; Preparation and anlysis of coordination complexes of nickel, iron and cobalt.

MT132: Calculus I – II

6 credits

Prerequisites: none

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.

CS101: Computing Concepts and Competencies

3 credits

Prerequisites: none

This course aims to supply the student with: most basic knowledge about computer science; overview about computer software; basic skills in using Windows 2000 and Windows XP; acquire the basic skills for making a scientific report in Word; for making a presentation in Powerpoint; for knowing how to use spreadsheets in scientific applications using Microsoft Excel and how to use Internet to search scientific documents and send email

BT201: Introduction Biotechnology

3 credits

Prerequisites: none

The course content will be: (1) Introduction to Biotechnology; (2) The Cell; (3) Applied Microbiology; (4) Genetic Engineering; (5) Enzyme technology; (6) Plant and Tissue culture; (7) Biotechnology food products; (8) Drink products; (9) Production of organic feedstocks and organic acids; (10) Production of Flavor- Enhancers and Amino acids

CH251: Organic Chemistry I

3 credits

Prerequisites: none

The chemistry of hydrocarbons: Alkanes, Cycloalkanes, Alkenes, Alkadienes, Alkynes and Arenes introduces the concept of structure, bonding, and reactivity of hydrocarbons, isomerism and stereochemistry, reaction mechanism and also their physical, chemical properties, nomenclature and preparations.

CH352: Organic Chemistry II

3 credits

Prerequisites: Organic Chemistry I

The Course CEM 252 will provide: Infrared Spectroscopy and Mass Spectroscopy; Nuclear Magnetic Resonance Spectroscopy; Ethers, Epoxides, and Sulfides; Conjugated Systems, Orbital Symmetry, and UV; Aromatic Compounds; Reactions of Aromatic Compounds; Ketones and Aldehydes; Amines; Carboxylic Acids; Carboxylic Acid Derivatives; Additions and Condensations of Enolate Ions; Carbohydrates and Nucleic Acids; Amino Acids, Peptides, and Proteins; Lipids; Synthetic Polymers.

CH355: Organic Chemistry Lab

(1) Organic laboratory techniques: distillation, measuring physical properties: melting points, recrystallization, chromatography, and synthesis. (2) Multi-step organic synthesis. Chemical literature assignment. Qualitative organic analysis. Separation, identification, and characterization of unknowns.

MI301: Introductory Microbiology

3 credits

Prerequisites: Biology of plants and animal

Overview of microbiology; Microbial cellular structure and function; Metabolism of microorganisms and control of microbial growth; Microbial genetics and genetic engineering; Interaction between microbes and plants, animals and human; Microbial ecology.

MI302: Introductory Microbiology Lab

The purpose of this course provide for students some experience in general microbiology (2) observe and do the steps to recognize micro-organisms in nature;(3) isolate these micro-organisms in the proper media (4) increasing knowledge about applied microbiology with fermented products.

ZO341: Fundamental Genetics

4 credits

Prerequisites: Plant Biology, Biochemistry.

The purpose of this course are to provide: (1) basic theoretical information about gentics, (2) the study of heridity; (3) current understanding of genes at molecular level; The content includes: Overview of genetics; The basic principles of genetics in relation to Mendel's laws; Overview of structure and replication of the genetics

material; Molecular properties of genes

PH183: Physics for Scientists and Engineers I

4 credits

Prerequisites: Algebra

Giving an overview about physics concept including Mechanic and heat phenomenon as vector of displacement, velocity, acceleration, force, momentum, kinds of energy, the conservation of energy, general types of moving, concept of temperature transfer, pressure, Phase transform for gas, liquid and solid.

PH184: Physics for Scientists and Engineers II

4 credits

Prerequisites: Physics I

Giving an overview about physics concept including Electricity and Optics phenomenon as Electric charge, Electrostatic potential, Electric charge inside capacitors, Energy stored in a capacitor, Electric current, Magnetic field, Trajectory of charges in constant Magnetic-fields, Magnetic field of a solenoid and toroid, Ampere's law, Induction, Coherent light and interference, Double-slit interference, Single slit diffraction, Diffraction by a double slit, Light absorption, Light scattering, Light dispersion, Conclusion of light waves

BC461: Biochemistry I

3 credits

Prerequisites: General Chemistry I, II and General biology

The students will be supplied the basic knowledge about amino acids, peptides, proteins, enzyme, nucleic acids and their metabolism. After this course, the students can pursue well the laboratory experiments, applied biochemistry in food, enzymes and other related subjects.

BC471: Biochemistry laboratory I

The course will demonstrate the basic theory of Biochemistry I & II that the students gain during the second years. The simple and basic experiments on Carbohydrates, amino acids, proteins, enzymes, lipids, vitamines, DNA… will help students to understand more clearly about these molecules, especially the methods to determine them. After this course, the students can follow well the related courses such as applied biochemistry in food, molecular biology, enzymology, and proteomics.

BC462: Biochemistry II

3 credits

Prerequisites: Biochemistry I; Organic Chemistry

Students can get basic and advance knowledge about: Food ingredients and chemical changes in food processing; Apply biochemistry in food science and technology, and basic biochemistry analysis methods.

BC472: Biochemistry laboratory II

The course will help students to understand in more details the theory of Biochemistry II by demonstration through experiments about Food ingredients and chemical changes in food processing; students will be trained more about basic and advanced biochemistry analysis method.

MM445: Basic Biotechnology

4 credits

Prerequisites: Basic Biochemistry and Cells and Molecules

This course introduces the foundation of Modern Biotechnology. Introduces commun methods and application of Biotechnology with regards to microorganism, plant and animal. Introduces commun methods and application of Biotechnology with regards to medicine, and human genome project

MM433: Microbial Genomics

3 credits

Prerequisites: Physiology of Prokaryotes, Biochemistry I, Computing Concepts & Competencies

The course provides for students: Genome sequence analysis; Construction of DNA microarrays; Comparative nucleic acid analysis; Proteome analysis; Application of microbial genomics; Cases studies – Bacteria, Parasites; Computer analysis of genome sequence databases. Applications to gene expression and phylogenetic analysis.

BT300: Research Methods

2 credits

Prerequisites: Introduction of Biotechnology

This course aims to supply the student with: (1) most basic knowledge and technique about biotechnology; (2) overview about observation; (3) the concept of experimental design; (4) basic principles of laboratory work, the techniques to analyse and application curve sofware; (5) writing report and presentation.

BB801: Molecular Biology

4 credits

Prerequisites: organic chemistry; biochemistry; biology and genetics

In this course, the aim is to give an insight of how a gene comes to expression in a prokaryotic or an eukaryotic cell. Emphasis will be put on fidelity of transcription and translation of the genetically encoded information, on regulation of gene expression, targeting of proteins and signalling.

BT303: Bio-Informatics

3 credits

Prerequisites: Basic Informatics and Molecular Biology

This course introduces the foundation of Bio-informatics. Introduces common basic bioinformatics software tools and the necessary experience to use these tools in solving real problem in reseach in DNA and aminoacid sequences.

BT301: Genomics and Its applications

4 credits

Prerequisites: Molecular biology, bioinformatics

Genomics describes the determination of the nucleotide sequence as well as many further analysis used to discover functional and structural gene information on all the genes of an organism. The course focus on genomic structure, genomic function, genome mapping, genome sequencing, how to find genomic database on the web, and some applied of genome such as gene expression and micro array.

CS464: Statistics for Biologists

3 credits

Prerequisites: none

Provide students statistical background to understand statistical tools to analyse data of biology research. Provide appropriate statistical tools to estimate parameters of population, test hypothesis, run regression analysis; Biological random variables; Estimation of population parameters; Testing hypotheses; Linear correlation and regression; Analyses of counted and measured data to compare several biological groups including contingency tables and analysis of variance.

BT197, BT198, BT199: Biotechnology Seminar I, II, III

1 credit

Prerequisites: none

To invite the key staff members in CTU and specialists from other institutions inside or outside of a country (if possible and available in a combination with their visits to BiRDI) for the specialized scientific

seminars as well as the introductory talks referring the Biotechnology major. A brief excursion to local institutions having the application of biotechnology is also included. To organize small workshops in which the students can express and discuss the interests of research topics (more and more deeper and complicated)

BT298, BT299: Biotechnology Seminar IV, V

2 credits

Prerequisites: Biotechnology Seminar I, II, III

Similar to the BT197, BT198, BT199 Biotechnology Seminar I, II, III, however it will pay more attention to biotechnology specializations

BT200: Field trip

To organize visit tours during the period up to one week to guide students for observation and survey activities in the representative leading institutions/companies/local producers referring the application of Biotechnology into practice.

BT480: Practical Training in Industry

Students will go to and practice at factories (food, berverages); plant breeding gardens, institutions, biotechnology companies... to check what they have learned in the university and to accumulate knowledge and experiences.

Elective courses:

CS465: Plant Physiology

3 credits

Prerequisites: General biology, Biochemistry

Course includes 7 chapters. Chapter 1 Cell physiology. Chapter 2 Water and Plant Cell. Chapter 3 Mineral Nutrient of Plant. Chapter 4 Solute transport. Chapter 5 Photosynthesis. Chapter 6 Plant respiration. Chapter 7 Plant growth and development. In addition students have 6 exercises in Plant physiology

CS072: Animal Physiology

3 credits

Prerequisites: General biology, Biochemistry

This course aims to supply the student with most basic knowledge about physiology of animal, basic principles of Animal physiology, practice skills and application of animal physiology for modern biotechnology: Animal physiology of blood and circulation; Animal physiology of digestion and absorption

Animal physiology of endocrine and reproduction

FS440: Food Microbiology

3 credits

Prerequisites: Microbiology, Food Biochemistry, Basic Biotechnology

To introduce students to major groups of micro-organisms of importance to the food industry, and to various aspects of food spoilage and preservation as they pertain to the microbiology of bacteria, yeasts and moulds. Conditions favoring the growth, survival and death of these micro-organisms will be investigated. Aspects impacting on the microbiological safety of foods will also be studied.

CS441 Plant Breeding and Biotechnology

3 credits

Prerequisites: Fundermental genetics,t molecular biology

The purpose of this course are to provide: (1) basic theoretical information about plant breeding (2) the study of methods of plant breeding; (3) current understanding of plant breeding at molecular level and how to evaluate the parameters applied for breeding

CS443: Aquaculture Biotechnology

3 credits

Prerequisites: Basic biology and Genetics

The purpose of this course is to introduce students to basic molecular biological concepts and techniques used in the fields of biotechnology and genetic engineering. This subject will be focused the applications of biotechnology in fish genetics such as (1) broodstock management , (2) chromosome (3) transgene and (4) genetic variation and divergence.

AN047: Food and Animal Toxicology

3 credits

Prerequisites: none

This course aims to supply the student with: (1) General Principles of Toxicology (2)Effects of Toxins on the Functional System of the body (3)Toxins (4)Environmental Toxicology(1).

MM413: Virology

3 credits

Prerequisites: Biology, Organic Chemistry

Lectures are organized into 4 phases: (1) A comprehensive introduction of molecular virology and principles relating to the study of viruses; (2) An in-depth look at representative viruses, starting with the smallest and

simplest RNA viruses, then progressing to successively more complex viruses to the largest and most complex DNA viruses, followed by the difficult-to-classify viroids and prions; (3) A comparative look at viral expression strategies, viral pathogenic mechanisms, and host responses. (4) The final phase is examines the public health impact and pathogenesis of specific viruses

BT302: Social and Economical Aspects of Biotechnology

2 credits

Prerequisites: Introduction of Biotechnology

This course aims to supply the student with: (1) most basic knowledge about the effects of the biotechnology on socio-economic in developing countries (especially in Vietnam); (2) overview about effects of the several manufacture processes, products on commercial and human development.

HR486: Biotechnology in Agriculture: Applications and Ethical Issues

3 credits

Prerequisites: Fundamental genetics, molecular genetics, biotechnology and plant breeding

The purpose of this course is to provide: (1) basic theoretical information about plant breeding (2) the study of methods of plant breeding; (3) current understanding of plant breeding at molecular level and how to evaluate the parameters applied for breeding.

CB344: Food Biochemistry

3 credits

Prerequisites: General Biochemistry, Organic Chemistry, Biology and Analysis Chemistry.

The course provides for students: (1) Food ingredients and chemical changes in food processing; (2) Apply biochemistry in food science and technology; (3) Help students to understand the position of biotechnology in food biochemistry

BT305: Plant and cell tissue culture

3 credits

Prerequisites: General biology, Plant physiology

Course includes 8 chapters: Chapter 1 History of plant and cell tissue culture, Chapter 2 Principles of Plant and cell tissue culture , Chapter 3 Laboratory lay out, Chapter 4 application of Plant and cell tissue culture

in propagation, Chapter 5 Application of plant and cell tissue culture in plant breeding, Chapter 6 Other application of Plant and cell tissue culture, Chapter 7 Acclimatization, Chapter 8 Trouble shooting in plant and cell tissue culture

BT306 : Proteomics

4 credits

Prerequisites: Biochemistry I, II; Organic Chemistry; Biology; and Analysis Chemistry.

The course will provide: (1) the nature of proteins, in particular, the way they are purified, how they are sequenced, how their three dimensional structure is determined; (2) how they are synthesized in the cell, how they fold, (3) their function and interaction; (4) The analytical methods and data analysis for protein separation, purification, and quantification.

BT304: Food fermentation

3 credits

Prerequisites: Food Microbiology; Food Biochemistry; Basic Biotechnology

To introduce students to the roles of microflora including moulds, yeasts and lactic acid bacteria in food fermentation processing. Functional properties and culture conditions of these micro-organisms as well as some representative products fermented from them will be investigated. The basic knowledge on nutrition and safety aspects of fermented products will also be studied.

ZO892: Bio-diversity

3 credits

Prerequisites: General Biology

This course aims to supply the student with the most basic knowledge about biodiversity by understanding the importance of biodiversity, biodiversity at risk, and how to protect biodiversity

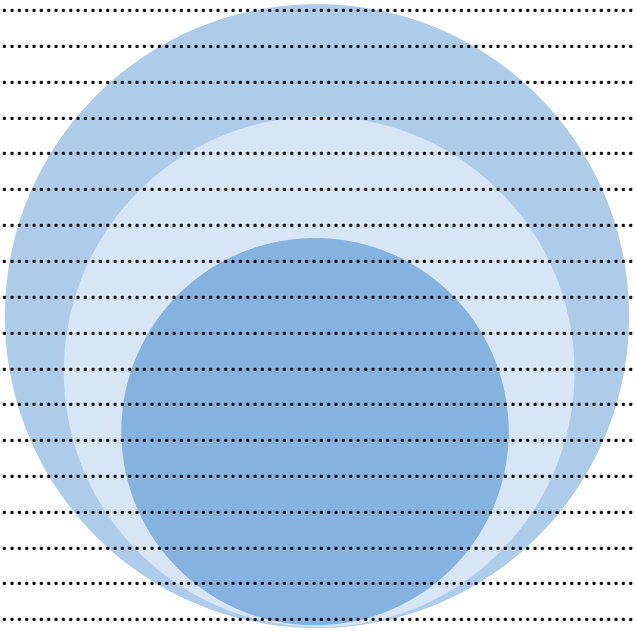
BB856: Plant Molecular Biology

3 credits

Prerequisites: Fundamental Genetics, Plant Physiology, Biochemistry

The course overview of basics of Molecular Biology of Plants; The basic principles methods for isolating plants genes; Overview of Plant Gene Regulation; Molecular Properties of genes.

Note:



Note: