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| **MINISTRY OF EDUCATION AND TRAINING**  **HCMC OPEN UNIVERSITY** | **SOCIALIST REPUBLIC OF VIETNAM**  Independent – Freedom – Happiness |

**COURSE SCHEDULE**

Program: **Biotechnology**

Type: **Undergraduate**

Training course: **Biotechnology**

Code: **52420201**

Duration: **Full time – 4 years**

1. **Goals** 
   1. **General goals**

* Students completing program gain the capacity for professional qualification, creative thinking, good ethics and health to address practical problems of field study.
* In general term, flexibility has been designed for both learning course and teaching methodology, responding to the students’ aspirations as well as the reality high-tech labor market demands, Additionally, the well-designed program interfaces between disciplines, allows the graduates will increasingly be recruited for their adaptability, and they could adapt readily in a new culture and working environment.
  1. **Professional goals**
     1. **Knowledge:** The foundation of current program should be able to equip them with basic social and natural knowledge to make meaningful contribution in any flied of study, including pharmaceutical biotechnology, agricultural and environmental biotechnology, and food technology.
     2. **Skills:** The training program helps the learner acquire skills in an interactive environment, including development of the skill of observation, identification, organization as well as analytic skills, that would help them in promoting an understanding about the field of study, specialized in molecular biology, microorganism, pharmaceutical biotechnology, environmental techniques as well as food techniques. After graduated, students have sufficient knowledge and skills to undertake scientific research projects, develop biotechnological products, or have further graduate study.
     3. **Attitude:** Students are well aware that application of professional ethics, their responsibilities to society.

1. **Learning Standard output**
   1. **Knowledge** 
      1. **Specialized knowledge**

* **General knowledge**: Obtain knowledge on the basic principles of the Marxist and Leninist Ideology, the revolution lines of Vietnam communist party, Ho Chi Minh ideology.
* **Professional knowledge**: Obtain the basic knowledge and professional expertise in biotechnology.
  + 1. **Professional capacity**
* Candidate pursue careers as scientists in academia or industry, whereas others go on to apply their training and expertise in related fields;
* Job opportunities are found in life science departments in colleges and universities; private and government research institutes; food production, pharmaceutical, agrichemical, and environmental industries;
* Graduates join the teaching in colleges or universities;
* Graduates may want to consider in business or economics to position themselves to excel in this industry, either in sales or management;
* Graduates could continue their education in graduate (Master or PhD) or professional school.
  1. **Skills** 
     1. **Basic skills**
* Providing the skill of organization, anatytical skill of chemical – microbiological – molecular – food chemical – genetic – tissue culture techniques.
* Evaluation, inspection, quantification and management of food quality, Vietnam’s and international quality standards systems, methodology of food quality assurance.
* Analysis and management of the raw materials’ quality, semi-finished products and biological products.
* Development and marketing of new biotechnological, biological products.
* Master specific laboratory skills relevant to careers in biotechnology, such as cell technology, microbiology, molecular biology, food technology and environmental engineering.
* Having capacity of research, training and self-training.
  + 1. **Soft skills**
* Communication, collaboration skill.
* Analytical thinking and problem solving soft skill.
* The ability of using foreign languages: Graduates achieve English level 3 according to the framework of foreign language skill for Vietnamese students.
* The ability of using information technology: Graduates achieve the basic requirement according to the framework of information technology skills standards issued by the Ministry of Information and Communications.
  1. **Attitude**
     1. **Moral qualities, professional sense, civic responsibility**
* Having good career ethics, community consciousness, and civic responsibility.
* Complying and respecting with disciplines, rules in labor organization.
  + 1. **The Ability of knowledge update and attitude in working**
* Having the spirit of knowledge update, innovation, and good participation in teamwork as well as personally working. Ability to update knowledge, attitude in work
  1. **Career outlook**
* Opportunities of graduates are widely varied, including research and development, quality assurance and quality control.
* Employment is available in teaching at institutes, university and biotechnology center.
  1. **Post-graduate outlook**
* Continuing the further study of postgraduate program in national or international universities.
  1. **The referent program, schedules**

The course schedule/program is referented from:

* Domestic programs: Can Tho University, Ho Chi Minh City University of Science – VNU, Ho Chi Minh City University of Agriculture and Forestry, An Giang University, Ho Chi Minh City University of Food Industry, Ho Chi Minh City University of Technology, Lac Hong University, Nha Trang University, Ho Chi Minh City International University, Da Nang University.
* International program: Universidad de Granad – Spain, Université de Poitiers – France, Tshwane University of Technology – South Africa, University of Johannesburg – South Africa.

1. **Program duration**

* 4 years (11 semesters. From semester 8, you can tailor your course and project selections to suit your goals and can choose from three different tracks: Pharmaceutical biotechnology, agricultural and environmental biotechnology, Food technology).

1. **Credits**

* Requirement: 127 credits (not included: Physical Education: 5 credits, National Defense Education: 8 credits).

1. **Program admission**

* Citizens who graduated from high school or equivalent under the provisions of the current regulations on enrollment of universities and colleges of the current system of the Ministry of Education and Training.

1. **Training process and graduation conditions** 
   1. **Training process**

The program is implemented in accordance with the Regulation on tertiary training according to the credit system issued together with Decision No. 43/2007 / QD-BGDDT of August 15, 2007, which is amended and supplemented Article No. 57/2012 / TT-BGDDT dated December 27, 2012 by the Ministry of Education and Training and the current tuition fee system of the Open University of Ho Chi Minh City. Ho Chi Minh.

* 1. **Graduation conditions**

Students are eligible for graduation when they meet the conditions stipulated in No, 27 of the Regulation on tertiary education according to the credit system issued together with Decision No. 43/2007 / QD-BGDDT dated August 15, 2007, amended and supplemented by a number of articles of the Ministry of Education and Training's Circular No. 57/2012 / TT-BGDDT dated December 27, 2012 and Article 25 of the Regulation on Academic Learning Current credit of the Open University of Ho Chi Minh City. Ho Chi Minh City, as follows:

* Until the time of graduation, student is not be examined for penal liability or not in the period of disciplinary suspension;
* Finish and accumulate all the required subject credits;
* GPA is equal or above 5.0.

1. **Score scale**

* The training program uses a 10-point scale and the equivalence point to the letter according to the rules of University.

1. **Program**

**Note. To: total, T: theory, P: practice/lab course**

| **No** | **Subject** | **Code** | **Credit** | | | **Note** |
| --- | --- | --- | --- | --- | --- | --- |
| **To** | **T** | **P** |
| * 1. **General training curriculum** | | | **40** | **39** | **1** |  |
|  | * + 1. **Political theory** | | **10** | **10** |  |  |
|  | Basic principles of Marxism-Leninism 1 | POLI1201 | 2 | 2 |  |  |
|  | Basic principles of Marxism-Leninism 2 | POLI2302 | 3 | 3 |  |  |
|  | Ho Chi Minh ideology | POLI2201 | 2 | 2 |  |  |
|  | The revolutionary policy of Vietnamese Communist Party | POLI2301 | 3 | 3 |  |  |
|  | * + 1. **Social theory** | | **4** | **4** |  |  |
|  | * + - 1. *Obligatory* |  | *2* | *2* |  |  |
|  | Introduction to laws | GLAW1201 | 2 | 2 |  |  |
|  | * + - 1. *Elective subject* |  | *2* | *2* |  |  |
|  | Research Methodology | EDUC1205 | 2 | 2 |  |  |
|  | Learning skills | EDUC1201 | 2 | 2 |  |  |
|  | * + 1. **Foreign language** |  | **14** | **14** |  |  |
|  | Advanced English 1 | GENG0405 | 4 | 4 |  |  |
|  | Advanced English 2 | GENG0406 | 4 | 4 |  |  |
|  | Advanced English 3 | GENG0307 | 3 | 3 |  |  |
|  | Advanced English 4 | GENG0308 | 3 | 3 |  |  |
|  | * + 1. **Nathematic – Information technology – Natural Science** | | **12** | **11** | **1** |  |
|  | Advanced Mathematics | MATH1402 | 4 | 4 |  |  |
|  | Introduction to Informatics | COMP0401 | 4 | 4 |  |  |
|  | Introduction to Chemistry | CHEM1501 | 4 | 3 | 1 |  |
|  | * + 1. **Physical education** |  | **5** |  | **5** |  |
|  | Physical education 1 | PEDU1201 | 2 |  | 2 |  |
|  | Physical education 2- choose 1 in the following modules:  - Basketball  - Handball  - Football  - Swimming | PEDU1302  PEDU1303  PEDU1304  PEDU1305 | 3 |  | 3 |  |
|  | * + 1. **Military education** | | **8** |  | **8** |  |
|  | Military education | DEDU1801 | 8 |  | 8 |  |
| * 1. **Professional training curriculum** | | | **87** | **63** | **24** |  |
|  | * + 1. **Basic knowledge** |  | **14** | **11** | **3** |  |
|  | Analytical Chemistry and Organic Chemistry | CHEM1302 | 3 | 3 |  | New |
|  | Labwork of Analytical Chemistry and Organic Chemistry | CHEM1202 | 1 |  | 1 |  |
|  | Introduction to biology | BIOT1201 | 2 | 2 |  | New |
|  | Cell biology | BIOT2401 | 3 | 2 | 1 |  |
|  | Molecular biology | BIOT2201 | 2 | 2 |  |  |
|  | Biostatistic | MATH2401 | 3 | 2 | 1 |  |
|  | * + 1. **Advanced and professional knowdge** | | **62** | **45** | **17** |  |
|  | * + - 1. **General subjects** | | **36** | **25** | **11** |  |
|  | Enrollment of Biotechnology | BIOT2204 | 2 | 2 |  | New |
|  | Plant physiology | BIOT2407 | 3 | 2 | 1 | New |
|  | Animal and human physiology | BIOT2406 | 3 | 2 | 1 | New |
|  | Human and environment | BIOT1202 | 2 | 2 |  | New |
|  | Biochemistry | BIOT2405 | 3 | 2 | 1 | New |
|  | Genetics | BIOT2404 | 3 | 2 | 1 | New |
|  | Introduction to microbiology | BIOT2501 | 4 | 3 | 1 |  |
|  | Microorganism technology | BIOT2403 | 3 | 2 | 1 | New |
|  | Gene technology | BIOT3427 | 3 | 2 | 1 |  |
|  | Biotechnological processes and equipment | BIOT3419 | 3 | 2 | 1 | New |
|  | Protein-enzyme technology | BIOT2402 | 3 | 2 | 1 |  |
|  | Bioinformatics | COMP3401 | 3 | 2 | 1 |  |
|  | Field trip | BIOT3231 | 1 |  | 1 | New |
|  | * + - 1. **Professional training curriculum** | |  |  |  |  |
|  | **Specialized in: Pharmaceutical biotechnology** | | **26** | **20** | **6** |  |
|  | *Obligatory* |  | ***21*** | ***16*** | ***5*** |  |
|  | Applied biotechnology in human disease diagnosis | BIOT3412 | 3 | 2 | 1 | New |
|  | Applied biotechnology in human disease treatment | BIOT3414 | 3 | 2 | 1 | New |
|  | Medical microbiology | BIOT3420 | 3 | 2 | 1 | New |
|  | Immunology | BIOT3226 | 2 | 2 |  | New |
|  | Pharmaceutical microbiology | BIOT3413 | 3 | 2 | 1 | New |
|  | Selection of **microorganisms in biotechnology** | BIOT3228 | 2 | 2 |  | New |
|  | Applied biotechnology in medicine | BIOT3422 | 3 | 2 | 1 |  |
|  | Natural compounds with biological activity | BIOT4204 | 2 | 2 |  |  |
|  | ***Selective subject (at least 5 credits)*** |  | ***5*** | ***4*** | ***1*** |  |
|  | Medicinal Natural Products Isolation | BIOT3411 | 3 | 2 | 1 |  |
|  | System of Pharmaceutical quality control | BIOT4222 | 2 | 2 |  |  |
|  | Seminar | BIOT3229 | 2 | 2 |  | New |
|  | Biotechnological product development | BIOT4208 | 2 | 2 |  |  |
|  | Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 | 3 |  | New |
|  | **Specialized in: Agricultural – Environmental biotechnology** | | **26** | **22** | **4** |  |
|  | *Obligatory* |  | ***20*** | ***16*** | ***4*** |  |
|  | Applied biotechnology in plant seed selection | BIOT3232 | 2 | 2 |  | New |
|  | Applied biotechnology in plant protection | BIOT3415 | 3 | 2 | 1 | New |
|  | Postharvest technology | BIOT3221 | 2 | 2 |  | New |
|  | Hitech agriculture | BIOT3418 | 3 | 2 | 1 | New |
|  | Applied biotechnology in agriculture and environment | BIOT3416 | 3 | 2 | 1 | New |
|  | Environment and public health | BIOT3227 | 2 | 2 |  | New |
|  | Environmental techniques | BIOT4405 | 3 | 2 | 1 |  |
|  | Environmental management | BIOT3216 | 2 | 2 |  |  |
|  | ***Selective subject (at least 6 credits)*** |  | ***6*** | ***6*** |  |  |
|  | Gene transfer technique in plant | BIOT3225 | 2 | 2 |  | New |
|  | Clearner production | BIOT4225 | 2 | 2 |  |  |
|  | Evaluation of environment effects | BIOT3223 | 2 | 2 |  | New |
|  | Seminar | BIOT3229 | 2 | 2 |  | New |
|  | Biotechnological product development | BIOT4208 | 2 | 2 |  |  |
|  | Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 | 3 |  | New |
|  | **Specialized in: Food biotechnology** | | **26** | **23** | **3** |  |
|  | *Obligatory* |  | ***18*** | ***15*** | ***3*** |  |
|  | Food sensory evaluation | BIOT3222 | 2 | 2 |  | New |
|  | Biotechnological processes in food technology | BIOT3210 | 2 | 2 |  |  |
|  | System of food quality control | BIOT3305 | 3 | 3 |  | New |
|  | Modern techniques in food technology | BIOT3219 | 2 | 2 |  |  |
|  | Food Biochemistry | BIOT3214 | 2 | 2 |  |  |
|  | Food microorganism | BIOT3421 | 3 | 2 | 1 | New |
|  | Food analysis techniques | BIOT3417 | 3 | 2 | 1 | New |
|  | Labwork of food processing | BIOT3230 | 1 |  | 1 | New |
|  | ***Selective subject (at least 6 credits)*** |  | ***8*** | ***8*** |  |  |
|  | Technology of preservation and processing of meat and fishery | BIOT3220 | 2 | 2 |  | New |
|  | Technology of preservation and processing vegetables | BIOT4217 | 2 | 2 |  |  |
|  | Functional foods | BOIT4221 | 2 | 2 |  |  |
|  | Human nutrients | BIOT3224 | 2 | 2 |  | New |
|  | Seminar | BIOT3229 | 2 | 2 |  | New |
|  | Biotechnological product development | BIOT4208 | 2 | 2 |  |  |
|  | Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 | 3 |  | New |
|  | * + 1. **Graduation internship and thesis** | | **11** | **7** | **4** |  |
|  | Graduation internship | BIOT4899 | 4 |  | 4 |  |
|  | - Graduation thesis  - Or take alternative credits in the elective subjects in specialize course | BIOT4799 | 7 | 7 |  |  |
| **Total** | | | **127** | **102** | **25** |  |

1. **Training schedules** *(expected)*

Note. To: total, T: theory, P: practice/lab course

| **No** | **Subjects** | **Code** | **Credit** | | | | | **Note** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **To** | | **T** | | **P** |
| **SEMESTER 1** | | | **14** | | **13** | | **1** |  |
|  | Advanced English 1 | GENG0405 | 4 | | 4 | |  |  |
|  | Advanced Mathematics B | MATH1402 | 4 | | 4 | |  |  |
|  | Introduction to Chemistry | CHEM1501 | 4 | | 3 | | 1 |  |
|  | Introduction to biology | BIOT1201 | 2 | | 2 | |  | NEW |
| **SEMESTER 2** | | | **13** | | **13** | |  |  |
|  | Basic principles of Marxism-Leninis 1 | POLI1201 | 2 | | 2 | |  |  |
|  | Advanced English 2 | GENG0406 | 4 | | 4 | |  |  |
|  | Introduction to Informatics | COMP0401 | 4 | | 4 | |  |  |
|  | Analytical Chemistry and Organic Chemistry | CHEM1302 | 3 | | 3 | |  | NEW |
| **SEMESTER 3** | | | **12** | | **10** | | **2** |  |
|  | Basic principles of Marxism-Leninis 2 | POLI2302 | 3 | | 3 | |  |  |
|  | Advanced English 3 | GENG0307 | 3 | | 3 | |  |  |
|  | Human and environment | BIOT1202 | 2 | | 2 | |  | NEW |
|  | Cell biology | BIOT2401 | 3 | | 2 | | 1 |  |
|  | Labwork of Analytical Chemistry and Organic Chemistry | CHEM1202 | 1 | |  | | 1 |  |
| **SEMESTER 4** | | | **14** | | **12** | | **2** |  |
|  | Introduction to laws | GLAW1201 | 2 | | 2 | |  |  |
|  | Molecular biology | BIOT2201 | 2 | | 2 | |  |  |
|  | Advanced English 4 (B2) | GENG0308 | 3 | | 3 | |  |  |
|  | Biochemistry | BIOT2405 | 3 | | 2 | | 1 | NEW |
|  | Introduction to microbiology | BIOT2501 | 4 | | 3 | | 1 |  |
| **SEMESTER 5** | | | **13** | | **10** | | **3** |  |
|  | Ho Chi Minh ideology | POLI2201 | 2 | | 2 | |  |  |
|  | Enrollment of Biotechnology | BIOT2204 | 2 | | 2 | |  | NEW |
|  | Animal and human physiology | BIOT2406 | 3 | | 2 | | 1 | NEW |
|  | Microorganism technology | BIOT2403 | 3 | | 2 | | 1 | NEW |
|  | Plant physiology | BIOT2407 | 3 | | 2 | | 1 | NEW |
| **SEMESTER 6** | | | **14** | | **11** | | **3** |  |
|  | The revolutionary policy of Vietnamese Communist Party | POLI2301 | 3 | | 3 | |  |  |
|  | Protein-enzyme technology | BIOT2402 | 3 | | 2 | | 1 |  |
|  | *One of following subjects*   * Research Methodology * Learning skills | EDUC1205  EDUC1201 | 2 | | 2 | |  |  |
|  | Genetics | BIOT2404 | 3 | | 2 | | 1 | NEW |
|  | Gene technology | BIOT3427 | 3 | | 2 | | 1 |  |
| **SEMESTER 7** | | | **10** | | **6** | | **4** |  |
|  | Biotechnological processes and equipment | BIOT3419 | 3 | | 2 | | 1 | NEW |
|  | Field trip | BIOT3231 | 1 | |  | | 1 | NEW |
|  | Biostatistic | MATH2401 | 3 | | 2 | | 1 |  |
|  | Bioinformatics | COMP3401 | 3 | | 2 | | 1 |  |
|  | Physical education 1 | PEDU1201 | 2 | |  | | 2 |  |
|  | Military education | DEDU1801 | 8 | |  | | 8 |  |
| **Specialized in: Pharmaceutical biotechnology** | | |  | |  | |  |  |
| **SEMESTER 8** | | | **13** | | **10** | | **3** |  |
|  | Applied biotechnology in human disease diagnosis | BIOT3412 | 3 | | 2 | | 1 | NEW |
|  | Immunology | BIOT3226 | 2 | | 2 | |  | NEW |
|  | Applied Plant biotechnology in medicine | BIOT3422 | 3 | | 2 | | 1 | NEW |
|  | Natural compounds with biological activity | BIOT4204 | 2 | | 2 | |  |  |
|  | Pharmaceutical microbiology | BIOT3413 | 3 | | 2 | | 1 |  |
|  | Physical education 2- choose 1 in the following modules:  - Basketball  - Handball  - Football   * Swimming | PEDU1302  PEDU1303  PEDU1304  PEDU1305 | 3 | |  | | 3 |  |
| **SEMESTER 9** | | | **13** | | **10** | | **3** |  |
|  | Applied biotechnology in human disease treatment | BIOT3414 | 3 | | 2 | | 1 | NEW |
|  | Medical microbiology | BIOT3420 | 3 | | 2 | | 1 | NEW |
|  | Selection of microorganisms in biotechnology | BIOT3228 | 2 | | 2 | |  | NEW |
|  | *One of following subjects* |  | *5* | | *4* | | *1* |  |
| * Medicinal Natural Products Isolation | BIOT3411 | 3 | | 2 | | 1 |  |
| * System of Pharmaceutical quality control | BIOT4222 | 2 | | 2 | |  |  |
| * Seminar | BIOT3229 | 2 | | 2 | |  | NEW |
| * Biotechnological product development | BIOT4208 | 2 | | 2 | |  |  |
| * Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 | | 3 | |  | NEW |
| **Specialized in: Agricultural and environmental biotechnology** | | | | | | | | |
| **SEMESTER 8** | | | **13** | | **10** | | **3** |  |
|  | Applied biotechnology in plant seed selection | BIOT3232 | 2 | | 2 | |  | NEW |
|  | Environmental management | BIOT3216 | 2 | | 2 | |  |  |
|  | Hitech agriculture | BIOT3418 | 3 | | 2 | | 1 | NEW |
|  | Applied biotechnology in agriculture and environment | BIOT3416 | 3 | | 2 | | 1 | NEW |
|  | Environmental techniques | BIOT4405 | 3 | | 2 | | 1 |  |
|  | Physical education 2- choose 1 in the following modules:  - Basketball  - Handball  - Football   * Swimming | PEDU1302  PEDU1303  PEDU1304  PEDU1305 | 3 | |  | | 3 |  |
| **SEMESTER 9** | | | **13** | | **12** | | **1** |  |
|  | Applied biotechnology in plant protection | BIOT3415 | 3 | | 2 | | 1 | NEW |
|  | Postharvest technology | BIOT3221 | 2 | | 2 | |  | NEW |
|  | Environment and public health | BIOT3227 | 2 | | 2 | |  | NEW |
|  | *three of following subjects:* |  | *6* | | *6* | |  |  |
| * Gene transfer technique in plant | BIOT3225 | 2 | | 2 | |  | NEW |
| * Clearner production | BIOT4225 | 2 | | 2 | |  |  |
| * Evaluation of environment eff | BIOT3223 | 2 | | 2 | |  | NEW |
| * Seminar | BIOT3229 | 2 | | 2 | |  | NEW |
| * Biotechnological product developmen | BIOT4208 | 2 | | 2 | |  |  |
| * Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 | | 3 | |  | NEW |
| **Specialized in: Food technology** | | | | | | | | |
| **SEMESTER 8** | | | **13** | | **11** | | **2** |  |
|  | Biotechnological processes in food technology | BIOT3210 | 2 | | 2 | |  |  |
|  | System of food quality control | BIOT3305 | 3 | | 3 | |  | NEW |
|  | Food Biochemistry | BIOT3214 | 2 | | 2 | |  |  |
|  | Food sensory evaluation | BIOT3222 | 2 | | 2 | |  | NEW |
|  | Labwork of food processing | BIOT3230 | 1 | |  | | 1 | NEW |
|  | Food microorganism | BIOT3421 | 3 | | 2 | | 1 | NEW |
|  | Physical education 2- choose 1 in the following modules:  - Basketball  - Handball  - Football   * Swimming | PEDU1302  PEDU1303  PEDU1304  PEDU1305 | 3 | |  | | 3 |  |
| **SEMESTER 9** | | | | **13** | **12** | **1** | |  |
|  | Food analysis techniques | BIOT3417 | 3 | | 2 | | 1 | NEW |
|  | Modern techniques in food technology | BIOT3219 | 2 | | 2 | |  |  |
|  | *Four of following subjects* |  | *8* | | *8* | |  |  |
| * Technology of preservation and processing of meat and fishery | BIOT3220 | 2 | | 2 | |  | NEW |
| * Technology of preservation and processing vegetables | BIOT4217 | 2 | | 2 | |  |  |
| * Functional foods | BOIT4221 | 2 | | 2 | |  |  |
| * Human nutrients | BIOT3224 | 2 | | 2 | |  | NEW |
| * Seminar | BIOT3229 | 2 | | 2 | |  | NEW |
| * Biotechnological product development | BIOT4208 | 2 | | 2 | |  |  |
| * Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 | | 3 | |  | NEW |
| **SEMESTER 10** | | |  | |  | |  |  |
|  | Graduation internship | BIOT4899 | 4 | |  | | 4 |  |
| **SEMESTER 11** | | |  | |  | |  |  |
|  | - Graduation thesis   * Or take alternative credits in the elective subjects in specialize course | BIOT4799 | 7 | | 7 | |  |  |

1. **Guiding the implementation of the program**
   1. **List of equal and/or alternative subjects**

| **TT** | **Subjects in previous program** | | | | **Subjects in current program** | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject** | **Code** | **Credits** | | **Subject** | **Code** | **Credits** | |
| **T** | **P** | **T** | **P** |
| **List of equal subjects** | | | | | | | | |
|  | Introduction to Informatics | COMP1401 | 2 | 1 | Introduction to Informatics | COMP0401 | 4 |  |
|  | Basic English 1 | GENG1401 | 4 |  | Basic English 3 | GENG0403 | 4 |  |
|  | Basic English 2 | GENG1402 | 4 |  | Basic English 4 | GENG0404 | 4 |  |
|  | Advanced english 1 | GENG1403 | 4 |  | Advanced english 1 | GENG0405 | 4 |  |
|  | Advanced english 2 | GENG1404 | 4 |  | Advanced english 2 | GENG0406 | 4 |  |
|  | Advanced english 3 | GENG2317 | 3 |  | Advanced english 3 | GENG0307 | 3 | 1 |
|  | Advanced english 4 | GENG2318 | 3 |  | Advanced english 4 | GENG0308 | 3 |  |
|  | Enrollment of Biotechnology | BIOT2301 | 3 |  | Enrollment of Biotechnology | BIOT2204 | 2 |  |
|  | Plant physiology | BIOT2503 | 3 | 1 | Plant physiology | BIOT2407 | 2 | 1 |
|  | Animal and human physiology | BIOT2504 | 3 | 1 | Animal and human physiology | BIOT2406 | 2 | 1 |
|  | Biochemistry | BIOT2502 | 3 | 1 | Biochemistry | BIOT2405 | 2 | 1 |
|  | Genetics | BIOT2505 | 3 | 1 | Genetics | BIOT2404 | 2 | 1 |
|  | Field trip | BIOT3402 |  | 2 | Field trip | BIOT3231 |  | 1 |
|  | Labwork of food processing 1 | BIOT3212 |  | 1 | Labwork of food processing | BIOT3230 |  | 1 |
|  | System of food quality control | BIOT3211 | 2 |  | System of food quality control | BIOT3305 | 3 |  |
|  | Food sensory evaluation | BIOT3406 | 2 | 1 | Food sensory evaluation | BIOT3222 | 2 |  |
| **List of alternative subjects** | | | | | | | | |
|  | Botany | BIOT1301 | 4 |  | Introduction to biology | BIOT1201 | 2 |  |
|  | Zoology | BIOT1302 | 3 |  | Evaluation of environment effects | BIOT3223 | 2 |  |
|  | Evolution & Biodiversity | BIOT2202 | 2 |  | Human and environment | BIOT1202 | 2 |  |
|  | Biotechnological processes and equipment 1 | BIOT2203 | 2 |  | Microorganism technology | BIOT2403 | 2 | 1 |
|  | Applied microorganism | BIOT3401 | 2 | 1 | Medical microbiology | BIOT3420 | 2 | 1 |
|  | Biotechnological processes and equipment 2 | BIOT3201 | 2 |  | Biotechnological processes and equipment | BIOT3419 | 2 | 1 |
|  | Labworf of Biotechnological processes and equipment | BIOT3202 |  | 1 | Biotechnological processes and equipment | BIOT3419 | 2 | 1 |
|  | Plant protection | BIOT3217 | 2 |  | Applied biotechnology in plant protection | BIOT3415 | 2 | 1 |
|  | Seed selection | BIOT3301 | 3 |  | Applied biotechnology in plant seed selection | BIOT3232 | 2 |  |
|  | Postharvest physiology | BIOT3204 | 2 |  | Postharvest technology | BIOT3221 | 2 |  |
|  | Animal biotechnology | BIOT3403 | 2 | 1 | Gene transfer technique in plant | BIOT3225 | 2 |  |
|  | Environmental biotechnology | BIOT3208 | 2 |  | Environment and public health | BIOT3227 | 2 |  |
|  | Agriculure | BIOT3303 | 3 |  | Hitech agriculture | BIOT3418 | 2 | 1 |
|  | Food fermentation technology | BIOT3302 | 3 |  | Food microorganism | BOIT3421 | 2 | 1 |
|  | Technology of preservation and processing of meat, egg and fishery | BIOT4212 | 2 |  | Technology of preservation and processing of meat and fishery | BIOT3220 | 2 |  |
|  | Technology of preservation and processing of sugar and Confectionery | BIOT4216 | 2 |  | Human nutrients | BIOT3224 | 2 |  |
|  | Food safety and hygiene | BIOT4220 | 2 |  | Environment and public health | BIOT3227 | 2 |  |
|  | Labwork of food processing 2 | BIOT3213 |  | 1 | Food analysis techniques | BIOT3417 | 2 | 1 |
|  | Additives in food processing | BIOT4203 | 2 |  | Food analysis techniques | BIOT3417 | 2 | 1 |
|  | Technology of preservation and processing of milk and milk product | BIOT4213 | 2 |  | Biotechnological product development | BIOT4208 | 2 |  |
|  | Food preservation and processing technology | BIOT4215 | 2 |  | Postharvest technology | BIOT3221 | 2 |  |
|  | Technique of processing tea - coffee - cacao | BIOT4214 | 2 |  | Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 |  |
|  | Microorganism analytic techniques | BIOT3404 | 2 | 1 | Selection of **microorganisms in biotechnology** | BIOT3228 | 2 |  |
|  | Applied molecular in healthcare | BIOT3501 | 3 | 1 | Applied biotechnology in human disease diagnosis | BIOT3412 | 2 | 1 |
|  | Biotechnology in the pharmaceutical industry | BIOT3209 | 2 |  | Applied Plant biotechnology in medicine | BIOT3422 | 2 | 1 |
|  | Agricutural microorganisms | BIOT3205 | 2 |  | Applied biotechnology in agriculture and environment | BIOT3416 | 2 | 1 |
|  | Pathophysiology | BIOT3304 | 3 |  | Applied biotechnology in human disease treatment | BIOT3414 | 2 | 1 |
|  | Modern topic of microorganism | BIOT4201 | 2 |  | System of Pharmaceutical quality control | BIOT4222 | 2 |  |
|  | Infectious diseases in humans | BIOT3218 | 2 |  | Immunology | BIOT3226 | 2 |  |
|  | Production technology of microorganisms | BIOT3207 | 2 |  | Application of biotechnology: Acheivements and Prospects | BIOT3306 | 3 |  |
|  | Food microbiology and traditional fermentation products | BIOT4501 | 3 | 1 | Food microorganism | BIOT3421 | 2 | 1 |
|  | Pathogenic microorganisms | BIOT3405 | 2 | 1 | Pharmaceutical microbiology | BIOT3413 | 2 | 1 |
|  | Seminar of Microorganisms | BIOT4207 | 2 |  | Seminar | BIOT3229 | 2 |  |
|  | Seminar of Agriculture | BIOT4205 | 2 |  | Seminar | BIOT3229 | 2 |  |
|  | Seminar of Food | BIOT4218 | 2 |  | Seminar | BIOT3229 | 2 |  |
|  | Graduation internship | BIOT4399 |  | 3 | Graduation internship | BIOT4899 |  | 4 |

* 1. **Degree design**

The bachelor degree program is divided into two phase:

* Phase 1: All students study the same program including subjects of general knowledge and the basis of the degree (from semester 1 to 7).
* Phase 2: Students will choose one of the three sub-disciplines for advanced study and complete the program (from semester 8 to 11).
  1. **Graduation**

Besides Practical labwork for graduation, students can choose to work on a Graduation thesis or study designated subjects to meet the requirements for graduation as stated in “Regulations for Credit study” by the University and the Faculty.

* + 1. **Graduation with a Graduation thesis**

Students who satisfy the following requirements are able to work on a Graduation thesis:

* Accumulate substantial amount of credits for the program and finish at least 95% of the degree’s workload;
* Have a total average accumulated score of at least 6.5;
* Have a score of at least 8.00 for the Practical Labwork for Graduation;
* Have the agreement from the Graduation Thesis supervisor.
  + 1. **Graduation without a Graduation Thesis**

Students choose the subjects from the alternative subject group in the same sub-discipline to fulfill the number of credits required for graduation.

* 1. **Guide for Application for Completion of the Degree Program for students of intake from 2099 to 2014 who study equal and/or alternative subjects**

Students can only apply for program completion when they have accumulated the least requried number of credits (not including Physical Education and Military training):

* + 1. **For training course of 2009 (year of admission)**

+ Specialized in: Microorganism and molecular biology: 121 credits

+ Specialized in: Food technology: 124 credits

+ Specialized in: Pharmacy: 125 credits

+ Specialized in Business Administration: 125 credits

* + 1. **For training course of 2010**

+ Specialized in: Microorganism and molecular biology: 127 credits

+ Specialized in: Food technology: 129 credits

+ Specialized in: Agriculture: 130 credits

* + 1. **For training course of 2011**

+ Specialized in: Microorganism and molecular biology: 128 credits

+ Specialized in: Food technology: 130 credits

+ Specialized in: Agriculture: 131 credits

* + 1. **For training course of 2012, and 2014**

+ Specialized in: Microorganism and molecular biology:129 credits

+ Specialized in: Food technology: 131 credits

+ Specialized in: Agriculture: 132 credits

1. **Syllabus** (Attachment)

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