

B. Sc. In Biotechnology

Objective

To train professionals able to develop and apply biotechnological process in order to solve social needs and problems related to agriculture, forestry, fishery, health, pharmacy and environment; assuring a sustainable use of the country's biodiversity. Professional development should be social responsible, humanist, ethical and entrepreneurship.

Student Profile

In agreement with the institutional legislation, the admitted students must have a solid background in the areas under evaluation in the admission examination corresponding to the major in biotechnology. The following are some additional desirable characteristics:

- Comprehension, synthesis and abstraction capacity
- Creativity
- Willingness to work with living beings.
- Personal and team work capacity
- Vocation for the chemical and biological sciences
- Work responsibility and respect for others
- Interest for entrepreneurship
- Interest for the resolution of social and environmental problems
- Interest for the development of technologies applied to food, bioremediation, agricultural and livestock industries.

Graduate Profile

The successful graduates in biotechnology will be able to develop and apply biotechnological processes in order to solve social needs and problems related to agriculture, forestry, fishery, health, pharmacy and environment; assuring a sustainable use of the country's biodiversity. All these actions aimed not just as problem-solving processes, but also, the sustainable production of consumer goods and services in benefit of society.

Knowledges

- Physical, chemical and biological processes as fundamentals basis for biotechnology
- Genetics primary principles, heredity in living organisms and genetic manipulation
- Instrumentation and standard methods that can be used for the development of biotechnological processes
- Environment, environment deterioration, environment restoration mediated by biotechnological processes
- Biotechnological processes that can be applied to solve problems related to agriculture, forestry, fishery, health, pharmacy and environment; assuring a sustainable use of the country's biodiversity
- Biotechnological diagnostic techniques for human, animal and vegetal health.
- Development of processes and methodologies for biotechnology research
- National and international current legislation regarding intellectual property and biosecurity for the development of biotechnological processes
- Use of Information and Communication technologies developed for biotechnology
- Reading and comprehension of technical texts in English

Skills

- To be able to identify social problems that can be solved by biotechnological processes

- To apply, develop or to modify biotechnological processes that can solve concrete problems or generate new products of use to agriculture, forestry, fishery, health, pharmacy and environment; assuring a sustainable use of the country's biodiversity
- Development of new bioprocesses and biotechnological high value-added products in accordance to current normativity and legislation, including biosecurity.
- Effective and efficient manipulation of biotechnological resources (instruments, materials and living organisms), following biosafety regulations to avoid hazards
- Appropriate manipulation of bioinformatics
- Provide consultation and technical assistance
- Participation in multidisciplinary research projects to generate new knowledge
- Reading and comprehension of English

Attitudes

- Creative, critical and reflexive mindedness
- Willingness for self- academic improvement
- Innovative, to be able to apply new techniques for problem-solving processes
- Social responsibility, to contribute to solve social problems
- Respect for the environment and conservation with a rational use of the biodiversity
- Ethical and moral professional and personal development.
- Entrepreneurship, aimed for the development of a private company

Values

- Autonomy and social responsibility
- Respect for the environment
- Pluralism
- Humanism
- Quality
- Innovation
- Equity and equality

Work Field

Some of the actual tendencies on the economic and social development indicate that biotechnology graduates can easily be incorporated into the labor market because:

- The need to increase the amount and quality in the production of agricultural and fishery sectors by the use of new technologies environmentally friendly
- The need for the development of sustainable industrial processes for the production of high value-added products
- The need for the development of green technologies with low or null impact for the environment for the production of consumer goods or environmental remediation
- The need of an extended knowledge of biodiversity to facilitate its rational use for the sustainable production of new products and biotechnological processes
- The need to apply the advances in genomics and molecular biology in favor of human and animal health

For these reasons, a successful graduate in biotechnology should be able to work in:

- Industry: Food, chemical, agricultural
- Independent consultant or technical assistant in governmental dependencies
- Researcher: Research centers, universities
- Entrepreneurship: Development of biotechnological products

2017 plan

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First semester Principles of biotechnology General chemistry Differential calculus Cellular biology Software for biotechnology Institutional Program of foreign languages Institutional Program of Humanist Formation	3 5 3 4 0	0 0 2 2 5	6 10 8 10 5	Sciences Sciences Sciences Sciences Sciences	Chemistry Chemistry Mathematics Biology Computational sciences
Second semester Organic chemistry (Q-CB1) Chemistry laboratory Biological diversity Probability and statistics (EST-C11) Integral Calculus (CI-A2) Institutional Program of foreign languages Institutional Program of Humanist Formation	5 0 4 3 3	0 4 2 2 2	10 4 10 8 8	Sciences Sciences Sciences Sciences Sciences	Chemistry Chemistry Biology Statistics Mathematics
Third semester Fundamentals of analytic methods Biochemistry I (Q-CB2) Molecular Biology Statistical Methods (EST-C12) Physicochemistry I Institutional Program of foreign languages Institutional Program of Humanist Formation	4 4 4 3 4	0 0 0 2 2	8 8 8 8 10	Sciences Sciences Sciences Sciences Sciences	Chemistry Chemistry Chemistry Statistics Biochemical engineering
Fourth Semester Genetics Biochemistry II (Q-CB2) Laboratory of Biochemistry Genetic engineering I Physicochemistry II Professional ethics Institutional Program of foreign languages Institutional Program of Humanist Formation	4 4 0 3 4 2	2 0 4 4 2 2	10 8 4 10 10 6	Sciences Sciences Sciences Sciences Sciences Social sciences	Chemistry Chemistry Chemistry Chemistry Biochemical engineering Philosophy
Fifth Semester Phytochemistry Genetic engineering II Biotechnological processes applied engineering Microbiology (M-CB1) Inmunology (I-CB1) Institutional Program of Professional training (induction seminar)	3 3 4 4 4	2 4 2 2 2	8 10 10 10 10	Sciences Sciences Sciences Sciences Sciences	Chemistry Chemistry Biochemical engineering Microbiology Microbiology
Sixth Semester Molecular diagnostic Vegetal physiology Microbial biotechnology Separation and purification of biotechnological products Animal physiology	3 4 4 4 4	3 2 3 2 3	9 10 11 10 11	Sciences Sciences Sciences Sciences Sciences	Chemistry Chemistry Biochemical engineering Biochemical engineering Physiology and pharmacology

Institutional Program of Social Service (induction seminar)					
Institutional Program of Professional Training					
Seventh semester					
Vegetal biotechnology	3	3	9	Sciences	Chemistry
Animal biotechnology	3	3	9	Sciences	Chemistry
Biotechnological project I	0	4	4	Sciences	Chemistry
Biochemistry of food	4	3	11	Sciences	Biochemical engineering
Environmental toxicology	4	2	10	Sciences	Physiology and pharmacology
Institutional Program of Social Service					
Institutional Program of Professional training					
Eight semester					
Bioinformatics	0	6	6	Sciences	Chemistry
Biotechnological project II	0	6	6	Sciences	Chemistry
Environmental biotechnology	3	3	9	Sciences	Biochemical engineering
Food biotechnology	4	3	11	Sciences	Biochemical engineering
Elective course I					
Institutional Program of Social Service					
Institutional Program of Professional Training					
Ninth semester					
Biotechnological project III	0	6	6	Sciences	Chemistry
Environmental impact	4	2	10	Sciences	Biology
Entrepreneurship training	2	3	7	Administration	Administration
Biotechnology normativity	3	1	7	Social sciences	Law
Elective course II					
Institutional Program of Social Service					
Institutional Program of Professional Training					

Degree Requirements

The graduate must satisfy the requisites dictated in the University's legislation, article 156 (Undergraduate General Legislation) that states the following:

"At the time that all the formal coursework and requisites contained in the curriculum of the program under study (Bachelor degree, technicians), the graduate should request the issuance of his/her degree after complying with the following requirements:

1. Have fulfilled with the requirements of Social service, humanism formation, Professional training, and foreign languages stipulated in the institutional programs
2. Demonstrate that there is no debt with the Universidad Autonoma de Aguascalientes
3. Have covered the established graduation fee stipulated by University's legislation
4. Have presented standard graduate examination."¹

¹Approved by the Honorable University council in an ordinary session held on December 15, 2011.

