FACULTY OF SCIENCES
B. Sc. In APPLIED MATHEMATICS

OBJECTIVE

The major in applied mathematics strives to train professionals with a solid background on the theory and the applications of mathematics, which allows them to further develop novel mathematical skills. The successful graduate in applied mathematics will be able to propose models that accurately describe real-life scenarios, processes and systems, and they will ultimately provide reliable inferences and optimal solutions. Emphasis will be made on mathematical modeling in scientific research, but also in economical, financial and industrial problems as well as in services. At the same time, the graduate in applied mathematics will be a responsible, leading educator and an active promoter of the effective teaching in mathematics.

ADMISSION REQUIREMENTS

In agreement with the university legislation, the candidates for admission must show a solid background in the areas evaluated by the admission examination corresponding to the major in applied mathematics. Additionally, the following are also desirable characteristics.
- Analytic and synthetic thinking.
- Abstraction, concentration, logical reasoning.
- Interest in science and mathematics.
- Problem-solving skills in mathematics.
- Use of information and communication technologies.
- Willingness to work in inter- and multidisciplinary teams.
- Patience and perseverance.
- Basic knowledge of English language.

AFTER GRADUATION

The bachelor of sciences in applied mathematics will master the skills, knowledges, attitudes and values described below.

Skills:
- A sufficient mastering of the theory and the applications of mathematics to provide accurate descriptions of phenomena in science and engineering.
- Developing optimization models and applying novel strategies of operations research and stochastic processes for decision making in financial institutions, private companies and the government.
- Designing and implementing preventive and corrective strategies based on optimization models to attract, protect and invest financial resources.
- Designing and implementing statistical strategies used to predict and analyze economic, financial and administration processes in order to avoid losses in the industry.
- Verifying and quantifying statistically the efficiency of industrial processes in order to determine their compliance with quality requirements.
- Using novel approaches of operations research and stochastic processes for the production and distribution of supplies and final products.

- Applying techniques of simulation and mathematical modeling based on differential equations (partial and ordinary) and stochastic processes to elucidate the behavior of a wide range of phenomena associated to production lines.
- Elaborating research protocols on pure and/or applied mathematics aiming at promoting the interest of students in mathematical and scientific research.
- Promoting both the knowledge and the teaching of mathematics using avant-guard pedagogical approaches, and novel mathematical methodologies and theories at all the education levels. The use of these tools will ultimately lead to a positive learning experience.
- Interpreting and communicating accurately technical texts in mathematics in both Spanish and English.

Knowledge:
- Mathematics:
  - Basic mathematics: mathematical logic, college algebra, linear algebra, modern algebra, one- and multivariable calculus,probability, mathematical analysis, complex analysis, topology, classic geometry, analytic geometry.
  - Applied mathematics: operations research, differential equations, financial mathematics, numerical analysis, discrete mathematics, mathematical modeling, simulation.
- Mathematical software.
- Statistics
  - Statistical inference, stochastic processes, sampling, regression analysis, design and analysis of experiments, statistical control of quality.
- Physics:
  - Mechanics, electricity and magnetism, thermodynamics, optics.
- Programming and computer resources.
- Methodology in scientific research.
- Values and professional ethics.
- Didactics, teaching models.
- Basic knowledge of English language.

Attitudes:
- Analytic and deductive thinking
- Critical thinking
- Exploratory
- Proactive
- Self-taught
- Perseverance
- Open minded
- Willingness to work alone or in teams

Values:
- Autonomy and social responsibility
- Pluralism
- Humanism
- Quality

WORK FIELDS

A graduate from the B. Sc. degree in applied mathematics will be able to work for the government, public or private universities, high schools or middle schools, financial institutions, as well as in public and private companies related to the industry or services. The graduate will be able to perform jobs as an employee, as a member of a coordination, a director or as a CEO in local, regional, national and international organizations.

DURATION

Ten semesters.

CURRICULUM

	T	P	C	Faculty	Department
First semester					
Mathematical logic and set theory	3	2	8	Sciences	Math. & Phys.
Algebraic systems and polynomial equations	3	4	10	Sciences	Math. & Phys.
Vector analytic geometry	3	2	8	Sciences	Math. & Phys.
Computer programming I	2	3	7	Sciences	Comput. Sci.

- Institutional program of foreign languages
- Institutional program of humanist training

	T	P	C	Faculty	Department
Second semester					
Matrices and vector spaces	3	2	8	Sciences	Math. & Phys.
Differential calculus	5	3	13	Sciences	Math. & Phys.
Computer programming II	2	3	7	Sciences	Comput. Sci.
Financial mathematics	3	2	8	Sciences	Math. & Phys.

- Institutional program of foreign languages
- Institutional program of humanist training

	T	P	C	Faculty	Department
Third semester					
Linear operators and canonical forms	3	2	8	Sciences	Math. & Phys.
Integral calculus	5	3	13	Sciences	Math. & Phys.
Numerical analysis I	3	2	8	Sciences	Math. & Phys.
Discrete mathematics	3	2	8	Sciences	Math. & Phys.

- Institutional program of foreign languages
- Institutional program of humanist training

Fourth semester

Differential vector calculus	5	3	13	Sciences	Math. & Phys.
Probability	3	2	8	Sciences	Statistics
Ordinary differential equations and modeling	3	2	8	Sciences	Math. & Phys.
Operations research I	3	2	8	Sciences	Math. & Phys.
Game theory	3	2	8	Sciences	Math. & Phys.

- Institutional program of foreign languages
- Institutional program of humanist training

Fifth semester

Integral vector calculus	5	3	13	Sciences	Math. & Phys.
Metaheuristics I	2	3	7	Sciences	Comput. Sci.
Operations research II	3	2	8	Sciences	Math. & Phys.
Statistical inference	3	2	8	Sciences	Statistics
Mechanics	3	4	10	Sciences	Math. & Phys.

Sixth semester

Mathematical analysis	5	2	12	Sciences	Math. & Phys.
Metaheuristics II	2	3	7	Sciences	Comput. Sci.
Operations research III	3	2	8	Sciences	Math. & Phys.
Sampling	3	2	8	Sciences	Statistics
Heat, waves and fluids	3	4	10	Sciences	Math. & Phys.

- Institutional program of professional training

Seventh semester

Integration theory	5	2	12	Sciences	Math. & Phys.
Dynamical systems	3	2	8	Sciences	Math. & Phys.
Regression analysis	3	2	8	Sciences	Math. & Phys.
Electricity and magnetism	3	4	10	Sciences	Math. & Phys.
Professional ethics	2	2	6	Social Sci.	Philosophy

- Institutional program of social services
- Institutional program of professional training

Eighth semester

Complex analysis I	2	3	7	Sciences	Math. & Phys.
Numerical Analysis II	3	2	8	Sciences	Math. & Phys.
Design and analysis of experiments	3	2	8	Sciences	Statistics
Optics	3	4	10	Sciences	Math. & Phys.
Philosophy of scientific research	2	2	6	Social Sci.	Philosophy

- Institutional program of social services
- Institutional program of professional training

Ninth semester

Complex analysis II	2	3	7	Sciences	Math. & Phys.
Abstract algebra	3	2	8	Sciences	Math. & Phys.
Statistical quality control	2	2	6	Sciences	Statistics
Teaching models	3	2	8	Social Sci.	Education
Elective I					

Tenth semester

Research methodology in mathematics	1	3	5	Sciences	Math. & Phys.
Simulation	1	4	6	Sciences	Math. & Phys.
Didactics and teaching skills	2	3	7	Social Sci.	Education
Partial differential equations	3	2	8	Sciences	Math. & Phys.
Elective II					

INSTITUTIONAL PROGRAMS

- Institutional program of foreign languages
- Institutional program of humanist training
- Institutional program of professional training
- Institutional program of social services
- Institutional program of tutoring
- Program for academic exchange

GRADUATION REQUIREMENTS

After the successful completion of studies, the graduate of the B. Sc. degree in applied mathematics must comply with the graduation requirements given by article 156, chapter XIV of the General Legislation for Undergraduate Studies (NI-20300-19) which states:

The student can request issuing of the bachelor's diploma after the completion of all the credits, the fulfillment of all the curricular requirements, the compliance of the following conditions:

I. Fulfilling the requisites of the institutional programs of social service, humanist training, professional training and foreign language.
II. Proving that no debt is owed to the Universidad Autónoma de Aguascalientes.
III. Payment of the graduation fee as required in the current legislation.
IV. Taking the graduation examination.