

## BIOMEDICAL ENGINEERING

### OBJECTIVE

The graduate student will be capable of design and install medical devices and systems. The biomedical engineer can perform feasibility studies for the acquisition, maintenance and calibration of clinical equipment. He will be able to work in Medical Equipment Design, Applied Research and Clinical Engineering Management. The student will receive a technical education balanced with a humanist perspective to achieve personal development and for benefit of its community.

### DESIRABLE STUDENT PROFILE:

These are the desirable traits for a student to achieve a successful performance throughout the Biomedical Engineering Program:

#### a) Knowledge

- Mathematical physics
- Natural Sciences
- Basic electricity
- Basic computing

#### b) Skills

- Abstract reasoning
- Constancy and dedication in the study
- Manual dexterity.
- Affinity to work and study real world problems.
- Team work.

#### c) Attitudes

- Affinity for electronics.
- Interest in scientific and technological information.
- Personal and social improvement.
- Social, ecological and community involvement.

### PROGRAM OUTCOME:

Upon completion of the Biomedical Engineering program, graduates are expected to have the following set of skills:

#### Abilities:

- Analyze variables and physiological structures for the design of Biomedical Systems
- Design, build and put in place biomedical devices, equipment and systems.
- Test equipment.
- Develop versatile biomedical devices for telemedicine environments.
- Redesign and rehabilitation of obsolete equipment.
- Develop applied research projects
- Develop data acquisition systems from biomedical sensors.
- Perform benefit cost studies for acquisition, maintenance and calibration of the medical equipment.
- Provide preventive, corrective and predictive maintenance to clinical devices and systems.
- Compliance with safety regulations and use of medical equipment
- Design and execute training programs for the operation of medical equipment.
- Maintain effective communication with suppliers, engineers and professionals in the health area.
- Fluid English communication in the field of Biomedical Engineering

#### Knowledge:

- Mathematical, physical, chemical and biological principles

- Principles of human physiology and clinical biochemistry
- Electronic medical instrumentation
- Medical signs
- Analog and digital electronic systems.
- Computer programming and applications
- Principles of operation of the main medical equipment
- Theory of engineering design
- Engineering project management bases and the medical equipment market
- Research methodology
- Preventive, corrective and predictive maintenance schemes and strategies.
- Technical specifications of equipment.
- Electrical installations.
- Technical regulations and guidelines for bidding process in the acquisition of equipment.
- Management of material, human and financial resources as well as medical equipment management.
- Quality systems of the medical care service

### Attitudes

1. Disposition to keep on updating continues.
2. Propose creative and innovative solutions to engineering problems.
3. Willingness to work as a team.
4. Opening to develop in multidisciplinary teams.
5. To work with criteria of respect to the environment.
6. Have an entrepreneurial spirit.
7. Human Development.

### Values

1. Autonomy and Social Responsibility.
2. Pluralism
3. Humanism
4. Quality

### PROSPECTIVE WORK FIELD:

The contexts in which these professionals work correspond to clinics, research and development. The biomedical engineer works in companies developing medical equipment and hospital support services. They can collaborate with related professionals in multidisciplinary teams. Some examples are hospitals, electronics design companies, biotechnology companies and pharmaceutical enterprises, among others.

### DURATION:

Nine semesters.

## CURRICULUM

Program 2012  
Career 47

	CENTER	DEPARTMENT
<b>First Semester</b>		
CHEMISTRY	BASIC SCIENCE	CHEMISTRY
ALGEBRA	BASIC SCIENCE	MATHS & PHY
INTRODUCTION TO BIOMEDICAL ENGINEERING	ENG. SCIENCE	BIOMEDICAL
BIOLOGY	BASIC SCIENCE	BIOLOGY
DIFFERENTIAL CALCULUS	BASIC SCIENCE	MATHS & PHY
OPERATIVE GROUPS	SOC & HUMAN SCI	SICOLOGY

**Second Semester**

LINEAR ALGEBRA  
 INTEGRAL CALCULUS  
 CHEMISTRY OF BIOMATERIALS  
 SCIENTIFIC TEXTS DRAFTING  
 CINEMATICS AND STATICS

**CENTER**

BASIC SCIENCE  
 BASIC SCIENCE  
 BASIC SCIENCE  
 ART & CULTURE  
 BASIC SCIENCE

**DEPARTMENT**

MATHS & PHY  
 MATHS & PHY  
 CHEMISTRY  
 HISP STUDIES  
 MATHS & PHY

**Third Semester**

CRITICISM THINKING  
 ELECTRICITY AND MAGNETISM  
 LOGIC CIRCUITS  
 SYS  
 PROGRAMMING LOGIC  
 SYS  
 VECTORIAL CALCULUS  
 MEDICAL BIOCHEMISTRY

**CENTER**

SOC & HUMAN SCI  
 BASIC SCIENCE  
 BASIC SCIENCE

**DEPARTMENT**

PHYLOSOPHY  
 MATHS & PHY  
 ELECTRONIC

**Fourth Semester**

DIFFERENTIALS EQUATIONS  
 ELECTRIC CIRCUITS  
 SYS  
 FIELDS AND WAVES  
 PROGRAMMING I  
 SYS  
 PHYSIOLOGY I

**CENTER**

BASIC SCIENCES  
 BASIC SCIENCES  
 BASIC SCIENCES  
 BASIC SCIENCES  
 BASIC SCIENCES

**DEPARTMENT**

MATHS & PHY  
 ELECTRONIC  
 MATHS & PHY  
 ELECTRONIC  
 PHYSIOLOGY

**Fifth Semester**

ELECTRONICS  
 SYS  
 COMPUTER ARCHITECTURE  
 SYS  
 PROGRAMMING II  
 SYS  
 HOSPITAL ELECTRICAL NETWORKS  
 PHYSIOLOGY II  
 BIOMEDICAL SIGNALS ANALYSIS

**CENTER**

BASIC SCIENCES  
 BASIC SCIENCES  
 BASIC SCIENCES  
 ENG. SCIENCES  
 BASIC SCIENCES  
 ENG. SCIENCES

**DEPARTMENT**

ELECTRONIC  
 ELECTRONIC  
 ELECTRONIC  
 BIOMEDICAL  
 PHYSIOLOGY  
 BIOMEDICAL

**Sixth Semester**

BIOELECTRONICS  
 BIOMEDICAL SIGNAL CONTROLLERS  
 BIOINSTRUMENTATION  
 PROBABILITY AND STATISTICS  
 CONTROL SYSTEMS  
 PERSONAL FINANCE

**CENTER**

ENG. SCIENCE  
 ENG. SCIENCE  
 ENG. SCIENCE  
 BASIC SCIENCE  
 ENG. SCIENCE  
 EC & MANAG SCI

**DEPARTMENT**

BIOMEDICAL  
 BIOMEDICAL  
 BIOMEDICAL  
 STATISTICS  
 ROBOTICS  
 FINANCE

**Seventh Semester**

MANAGEMENT SKILLS  
 STATISTICAL INFERENCE  
 BIOMEDICAL SYSTEMS AND EQUIPMENT  
 BIOINSTRUMENTATION II

**CENTER**

EC & MANAG SCI  
 BASIC SCIENCE  
 ENG. SCIENCE  
 ENG. SCIENCE

**DEPARTMENT**

BASIC MANAG  
 STATISTICS  
 BIOMEDICAL  
 BIOMEDICAL

IMAGENOLOGY  
SCIENCE, TECHNOLOGY AND VALUES

ENG. SCIENCE  
SOC & HUMAN SCI

BIOMEDICAL  
PHYLOSOHY

**Eighth Semester**

HOSPITAL BIOSECURITY  
CLINICAL PROCESS ENGINEERING  
ELECTIVE COURSE I  
NETWORK DESIGN  
SYS  
ECONOMIC EVALUATION OF PROJECTS  
ETHICS  
ELECTIVE COURSE II

**CENTER**

ENG. SCIENCE  
ENG. SCIENCE  
ENG. SCIENCE  
BASIC SCIENCE

**DEPARMENT**

BIOMEDICAL  
BIOMEDICAL  
BIOMEDICAL  
ELECTRONIC

EC & MANAG SCI  
SOC & HUMAN SCI  
ENG. SCIENCE

FINANCE  
PHYLOSOHY  
BIOMEDICAL

**CENTER**

**Ninth Semester**

Intenrship Project

ENG. SCIENCE

**DEPARMENT**

BIOMEDICAL

**INSTITUTIONAL PROGRAMS**

- Professional practices
- Social service
- Tutorials
- Mobility and Academic Exchange
- Promotion of foreign languages
- Humanist Training Program

**DEGREE REQUIREMENTS**

The graduate must adhere to what is established in Chapter XIV of the degree at the technical, technical level superior and bachelor's degree, article 156 of the General Teaching Regulation that states the following:

“Once you have accredited all the subjects and requirements indicated in the curriculum of the level courses technician, technical superior and bachelor, the graduate can request the issuance of his degree in the Department of School Control, after complying with the following elements:

I.- Have fulfilled the requirements of Social Service, Humanistic Training, Professional Practices and Foreign Languages, defined in institutional programs;

II.- Check that there is no debit with the Autonomous University of Aguascalientes;

III.- Have covered the quota established in the plan of taxation to obtain the title; and

IV.- Have submitted the exit exam.”