

# ENGINEERING AND TECHNOLOGY DEGREE PROGRAMS

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## AERONAUTICAL ENGINEERING TECHNOLOGY ASSOCIATE IN APPLIED SCIENCE (AAS) DEGREE

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The AAS aeronautical engineering technology program stresses the fundamentals of engineering technology and science. This major has been designed primarily as a transfer program, although graduates will be prepared to enter industry as engineering technologists.

Courses in this two-year degree program can be applied to a four-year curriculum in engineering technology.

Graduates will have the skills necessary to obtain entry-level positions within engineering technology and related fields or continue their education toward a bachelor's degree.

After this program is completed, students can either continue on in the College's bachelor of science degree programs in engineering or engineering technology (by taking some additional courses), or transfer to other colleges or universities. The College has articulation agreements with New York Institute of Technology and with Manhattan College.

In addition, this program is accredited by the Engineering Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md. 21202-4012, telephone 410.347.7700.

### PROGRAM OBJECTIVES

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Aeronautical Engineering Technology AAS program educational objectives are developed in order to achieve student learning outcomes that address what students are expected to know and be able to do by the completion of their degree program, and prepare them for the postgraduation activities. These program objectives are intended to produce versatile engineering technology graduates who:

- 1) Will be able to obtain a career as a technician in aeromechanical engineering technology field. Graduates will be successful in their pursuit of technician positions that require basic design, development and manufacturing of aeronautical and mechanical systems.
- 2) Will be able to pursue professional and/or continued education.
- 3) Will conduct themselves as responsible members

of society and understand the need for continuous professional improvement.

### STUDENT OUTCOMES

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The Aeronautical Engineering Technology AAS program presents information and learning experience to students. These form the basis for particular abilities that students should be able to demonstrate prior to graduation. These abilities coincide with ABET criterion 3 (a) through (k) requirements as presented below:

- a) Graduates will demonstrate an ability to apply the knowledge, techniques, skills, and modern tools used in aeronautical/mechanical engineering technology program.
- b) Graduates will demonstrate an ability to apply knowledge of mathematics, science, engineering and technology to aeronautical engineering technology problems.
- c) Graduates will demonstrate an ability to conduct standard tests and measurements; to conduct, analyze and interpret experiments.
- d) Graduates will demonstrate an ability to design basic systems and components of an aeronautical system.
- e) Graduates, through group projects and oral presentation, will gain the broad education necessary to function effectively as a member of a team.
- f) Graduates will demonstrate an ability to identify, formulate and solve aeronautical engineering technology problems.
- g) Graduates will be able to communicate effectively through oral presentation, writing and graphic communication.
- h) Graduates will demonstrate an understanding of the need for and an ability to engage in self-directed continuing professional development.
- i) Graduates will demonstrate an understanding of professional and ethical responsibility, including a respect for diversity.
- j) Graduates will develop the broad education necessary to understand the impact of engineering technology solutions in a societal and global context.
- k) Graduates will demonstrate recognition of the need for quality, timeliness and continuous improvement.

## **ANIMATION AND DIGITAL TECHNOLOGIES ASSOCIATE IN APPLIED SCIENCE (AAS) DEGREE**

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The AAS in animation and digital technologies degree has been developed to provide students proficiency in computer-aided design, graphic imaging and animation. In addition to basic college courses, students will be taught to develop 2-D and 3-D images that can be combined to create still renderings of any style or complexity and whose sequential succession can be used to form animated sequences on videotape.

Graduates of this program will find their computer skills applicable to a multitude of computer and related fields, including architecture, construction, graphic design and advertising.

Graduates can also pursue one of the College's bachelor of science degree programs or transfer to bachelor of science degrees in architectural or graphic design at other institutions. The College has articulation agreements with New York Institute of Technology and with Manhattan College.

### **PROGRAM OBJECTIVES**

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Graduates will:

- 1) Develop solid foundation skills in the field of computer-aided graphic design, 3-D animation for video games, motion graphics and interactive media.
- 2) Gain proficiency with modern 2-D/3-D computer graphics tools and related design methodologies. Students will attain skills required for internships, entry-level positions or higher-education opportunities such as a BS degree in animation and digital technologies.
- 3) Empower themselves with self-promotion, communication and career networking skills relevant to the computer graphics industry.
- 4) Experience career success in a global marketplace through discipline, creativity and a lifetime of self-improvement.

### **PROGRAM OUTCOMES**

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The program outcomes for the AAS in animation and digital technologies concentration are as follows.

- a) Graduates will be able to apply their knowledge of design, graphics and 3-D animation principles toward the development of a portfolio and demo reel.
- b) Graduates will learn relevant technology and market trends as used in the computer graphics industry.
- c) Graduates will learn teamwork and creative project management through group critique, oral and multimedia presentations.
- d) Graduates will develop critical thinking, creative problem solving and time management skills.
- e) Graduates will leverage 3-D modeling knowledge to develop product visualization and rapid prototyping skills.
- f) Graduates will be positioned as computer graphics generalists with a specialization in 3-D animation for video games. Students will display a broad knowledge of 3-D modeling, texturing and rigging for both hard-surface and character models.
- g) Graduates will understand the ethical standards and professional responsibilities in their field.

## **ELECTRONIC ENGINEERING TECHNOLOGY – AVIONICS ASSOCIATE IN APPLIED SCIENCE (AAS) DEGREE**

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This degree program provides the necessary technical foundation to prepare graduates for entry-level employment in the field of electronic technology and related technologies, as well as the ability to transfer to baccalaureate-level technology programs.

Avionics encompasses electronic communication, navigation, surveillance and flight control systems. These systems have become complex, integrated and computer-controlled. The need for avionics technicians to service and maintain this equipment is growing accordingly. This two-year program develops these skills, starting from fundamentals and proceeding to the study of aircraft electronic systems. Graduates are prepared for positions with aircraft maintenance or manufacturing organizations. In addition, graduates of this program will find career opportunities in the field of general electronics, system construction and product design. Students are encouraged to pursue the College's bachelor of science in electronic engineering technology degree program, which provides in-depth application of theory and physical science to advanced avionics systems.

Graduates of the program are also prepared for the Federal Communications Commission (FCC) General Radiotelephone Operator License examination. Graduates must pass a qualifying exam for the FCC License to graduate.

In addition, this program is accredited by the Engineering Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md., 21202-4012, telephone 410.347.7700.

Upon completion of curriculum requirements, students in this program are eligible to participate in Technical Operations - Collegiate Training Initiative program. See TO-CTI section.

### **PROGRAM OBJECTIVES**

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Electronics Engineering Technology-Avionics AAS program educational objectives are developed in order to help achieve student learning outcomes that address what students are expected to know and be able to do by the completion of their degree program, and prepare them for the postgraduation activities. These

program objectives are intended to produce versatile engineering technology graduates who:

- 1) Will be able to obtain careers as avionics/electronics technicians. AAS avionics graduates will be able to pursue positions that require avionics/electronics design, development, installation, maintenance and repair.
- 2) Will be able to pursue FCC license, professional and/or continued education.
- 3) Will conduct themselves as responsible members of society and understand need for continuous professional improvement.

### **STUDENT OUTCOMES**

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The Electronics Engineering Technology-Avionics AAS program presents information and learning experience to students. These form the basis for particular abilities that students should be able to demonstrate prior to graduation. These abilities coincide with ABET criterion 3 (a) through (k) requirements as presented below:

- a) Graduates will demonstrate an ability to apply the knowledge, techniques, skills, and modern tools used in electronics engineering technology-avionics programs.
- b) Graduates will demonstrate an ability to apply knowledge of mathematics, science, engineering and technology to avionics engineering technology problems.
- c) Graduates will demonstrate an ability to conduct standard tests and measurements; to conduct, analyze and interpret experiments.
- d) Graduates will demonstrate an ability to design basic systems and components of an avionics system.
- e) Graduates, through group projects and oral presentation, will gain the broad education necessary to function effectively as a member of a technical team.
- f) Graduates will demonstrate an ability to identify, formulate and solve avionics engineering technology problems.
- g) Graduates will be able to communicate effectively through oral presentation, writing and graphic communication.

- h) Graduates will demonstrate an understanding of the need for and an ability to engage in self-directed continuing professional development.
- i) Graduates will demonstrate an understanding of professional and ethical responsibility, including a respect for diversity.
- j) Graduates will develop the broad education necessary to understand the impact of engineering technology solutions in a societal and global context.
- k) Graduates will demonstrate recognition of the need for quality, timeliness, and continuous improvement.

## **ELECTRONIC ENGINEERING TECHNOLOGY – AVIONICS CONCENTRATION BACHELOR OF SCIENCE (BS) DEGREE**

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The major course component of the electronics technology BS degree with a concentration in avionics has been developed to provide students proficiency in sophisticated aviation electronics systems found on board commercial, corporate and private aircraft. The program will stress science and technology as they apply to today's modern fleet of aircraft.

This degree program provides in-depth application of theory and physical sciences to advanced avionics systems found on today's modern fleet of aircraft. The curriculum includes the avionics courses of the AAS avionics degree program, which applies mathematics and science to electrical circuits, digital electronics, aircraft communication/navigation systems, and aircraft pulse/radar systems. The additional avionics courses of the BS degree cover aircraft power/distribution systems, flight control/management systems, electronics flight instrument systems, long-range navigation systems integrated avionics systems, and traffic alert and avoidance systems. Avionics installation and maintenance, reliability and maintainability, as well as integrated logistics support courses, are also covered as part of this degree program.

The Lab View program Graphical Programming for Instrumentation is used for the avionics laboratory/exercises wherever applicable.

Students must complete an avionics degree project (see AET409 in the course descriptions) in order to graduate. The project must be approved by the department chair.

Graduates of the program are also prepared for the Federal Communications Commission (FCC) General Radiotelephone Operator License examination. Graduates must pass a qualifying exam for the FCC License to graduate.

In addition, this program is accredited by the Engineering Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md., 21202-4012, telephone 410.347.7700.

Upon completion of curriculum requirements, students in this program are eligible to participate in Technical Operations - Collegiate Training Initiative program. See TO-CTI section.

### **PROGRAM OBJECTIVES**

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Electronics Engineering Technology-Avionics BS program educational objectives are developed so as to achieve student learning outcomes that address what students are expected to know and be able to do by the completion of their degree program, and prepare them for the postgraduation activities. These program objectives are intended to produce versatile engineering technology graduates who:

- 1) Will be successful in their chosen avionics/electronics career. Graduates of this program will be able to pursue positions that require avionics/electronics design, development, implementation, and manufacturing of avionics systems and processes.
- 2) Will be able to pursue FCC license, professional education, graduate study and/or continued education.
- 3) Will conduct themselves as responsible members of society through involvement in community and professional engagement.

### **STUDENT OUTCOMES**

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The Electronics Engineering Technology-Avionics program presents information and learning experience to students. These form the basis for particular abilities that students should be able to demonstrate prior to graduation. These abilities coincide with ABET criterion 3 (a) through (k) requirements and are presented below:

- a) Graduates will demonstrate an ability to apply the knowledge, techniques, skills and modern tools used in electronics engineering technology-avionics program.
- b) Graduates will demonstrate an ability to apply knowledge of mathematics, science, engineering and technology to avionics engineering technology problems.
- c) Graduates will demonstrate an ability to conduct standard tests and measurements; to conduct, analyze and interpret experiments, and to apply experimental results to improve processes.
- d) Graduates will demonstrate an ability to design systems, components or processes of electronics/avionics systems.

- e) Graduates, through group projects and oral presentation, will gain the broad education necessary to function effectively as a member of a technical team.
- f) Graduates will demonstrate an ability to identify, formulate and solve electronics engineering technology problems.
- g) Graduates will be able to communicate effectively through oral presentation, writing and graphic communication.
- h) Graduates will demonstrate an understanding of the need for and an ability to engage in self-directed continuing professional development.
- i) Graduates will demonstrate an understanding of professional and ethical responsibility, including a respect for diversity.
- j) Graduates will develop the broad education necessary to understand the impact of engineering technology solutions in a societal and global context.
- k) Graduates will demonstrate recognition of the need for quality, timeliness and continuous improvement.

## **ELECTRONIC ENGINEERING TECHNOLOGY – ELECTRONICS BACHELOR OF SCIENCE (BS) DEGREE**

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Innovation in the ever-growing field of electronics depends more than ever on properly educated and trained individuals who can conceive, design, develop and produce solutions to modern technical problems. Accordingly, the Electronic Engineering Technology program prepares graduates with technical and managerial skills necessary to enter careers as technologists in such industries as aerospace, computers, communications, medical, chemical and energy supply.

Students are offered training in a wide range of areas such as control systems, microprocessors, communications systems, computer applications and computer-aided design. Moreover, the program emphasizes written and oral communication skills as well as modern methods of industrial administration and supervision.

This program is accredited by the Engineering Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md., 21202-4012, telephone 410.347.7700.

### **PROGRAM OBJECTIVES**

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Electronic Engineering Technology program educational objectives are developed in order to achieve student learning outcomes that address what students are expected to know and be able to do by the completion of their degree program, and prepare them for the postgraduation activities. These program objectives are intended to produce versatile engineering technology graduates who:

- 1) Will be successful in their chosen careers.  
Graduates of this program will be able to obtain positions that require design, development, implementation and manufacturing of electronic systems and processes.
- 2) Will be able to pursue graduate study, professional and/or continued education.
- 3) Will conduct themselves as responsible members of society through involvement in community and professional engagement.

### **STUDENT OUTCOMES**

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The Electronic Engineering Technology program presents information and learning experiences to students. These form the basis for particular abilities that students should be able to demonstrate prior to graduation. These abilities coincide with ABET criterion 3 (a) through (k) requirements as presented below:

- a) Graduates will demonstrate an ability to apply the knowledge, techniques, skills, and modern tools used in electronics engineering technology program.
- b) Graduates will demonstrate an ability to apply knowledge of mathematics, science and engineering principles to analysis and design.
- c) Graduates will demonstrate an ability to conduct standard tests and measurements; to conduct, analyze and interpret experiments, and to apply experimental results to improve processes.
- d) Graduates will demonstrate an ability to design systems, components or processes of electronics systems.
- e) Graduates, through group projects and oral presentation, will gain the broad education necessary to function effectively as a member of a technical team.
- f) Graduates will demonstrate an ability to identify, formulate and solve electronics engineering technology problems.
- g) Graduates will be able to communicate effectively through oral presentation, writing and graphic communication.
- h) Graduates will demonstrate an understanding of the need for and an ability to engage in self-directed continuing professional development.
- i) Graduates will demonstrate an understanding of professional and ethical responsibility, including a respect for diversity.
- j) Graduates will develop the broad education necessary to understand the impact of engineering technology solutions in a societal and global context.
- k) Graduates will demonstrate recognition of the need for quality, timeliness and continuous improvement.

## **MECHANICAL ENGINEERING TECHNOLOGY – AERONAUTICAL OR COMPUTER-AIDED DESIGN BACHELOR OF SCIENCE (BS) DEGREE**

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The BS degree in mechanical engineering technology has been developed to provide students with a solid foundation in the use of computers in math, science and the graphic arts with application to the mechanical engineering technology field, and to engage students with technical problems and projects that stimulate their critical thinking and build communication and teamwork skills.

Exposure to the design process exists throughout the curriculum in various engineering courses such as Solid Edge, Computer Aided Three-dimensional Interactive Application (CATIA), PATRAN/ NASTRAN, Computational Method in Engineering with MATLAB and a capstone degree project.

The goal is to provide students with the fundamentals of engineering, and the knowledge and experience in analytical, computational and experimental methods as well as an ability to design and evaluate these approaches for use in a given situation. With this in mind, students in the mechanical engineering technology program can choose one of the following two options:

### 1) Aeronautical Option:

This option strives to provide an in-depth application of engineering technology with a focus on aeronautical engineering principles.

### 2) Computer-aided Design Option:

This option stresses the fundamentals of engineering with an emphasis on 3-D graphics using CATIA and Solid Edge for the design and analysis of structures.

In addition, this program is accredited by the Engineering Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, Md., 21202-4012, telephone 410.347.7700.

## **PROGRAM OBJECTIVES**

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Mechanical Engineering Technology program educational objectives are developed in order to achieve student learning outcomes which address what students are expected to know and be able to do by the completion of their degree program, and prepare them for the postgraduation activities.

These program objectives are intended to produce versatile engineering technology graduates who:

- 1) Will be successful in their chosen career. Graduates of this program will be able to obtain positions that require design, analysis, development and implementation of mechanical systems.
- 2) Will be able to pursue professional education, graduate study and/or continued education.
- 3) Will conduct themselves as responsible members of society through involvement in community and professional engagement.

## **STUDENT OUTCOMES**

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The Mechanical Engineering Technology program presents information and learning experience to students. These form the basis for particular abilities that students should be able to demonstrate prior to graduation. These abilities coincide with ABET criterion 3 (a) through (k) requirements as presented below:

- a) Graduates will demonstrate an ability to apply the knowledge, techniques, skills and modern tools used in the mechanical engineering technology program.
- b) Graduates will demonstrate an ability to apply knowledge of mathematics, science and engineering principles to analysis and design.
- c) Graduates will demonstrate an ability to conduct standard tests and measurements; to conduct, analyze and interpret experiments, and to apply experimental results to improve processes.
- d) Graduates will demonstrate an ability to design systems, components or processes of a mechanical system.
- e) Graduates, through group projects and oral presentation, will gain the broad education necessary to function effectively as a member of a technical team.
- f) Graduates will demonstrate an ability to identify, formulate and solve mechanical engineering technology problems.
- g) Graduates will be able to communicate effectively through oral presentation, writing and graphic communication.
- h) Graduates will demonstrate an understanding of the need for and an ability to engage in self-directed continuing professional development.



- i) Graduates will demonstrate an understanding of professional and ethical responsibility, including a respect for diversity.
- j) Graduates will develop the broad education necessary to understand the impact of engineering technology solutions in a global, economic, environmental and societal context.
- k) Graduates will demonstrate recognition of the need for quality, timeliness and continuous improvement.

# ENGINEERING – MECHATRONICS BACHELOR OF SCIENCE (BS) DEGREE

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The bachelor of science in engineering focuses on mechatronics, which is the study of the synergistic use of mechanical, electrical and computer engineering. Mechatronics engineering produces “smart” products from the Mars Rover to a desktop printer.

The rigorous program has several objectives: It provides a link between academia and industry; and provides students with the knowledge of analytical, computational and experimental methods. Graduates will have the ability to evaluate these methods for use in practical situations.

Core courses include a strong foundation in mechanical engineering and electronics. Students then choose electives in engineering analysis, design and computer programming. In the last two semesters of the program, students will work on design projects related to mechatronics components development.

The program instills a broad-based understanding of the fundamental technical subject areas associated with mechatronics engineering so they are ready for immediate employment in industry or graduate study.

## PROGRAM OBJECTIVES

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Program educational objectives for the BS in mechatronics engineering were developed such that to achieve student learning outcomes that describe what students are expected to know and be able to do by the time of graduation as well as to prepare them for the post-graduation activities. These program objectives are intended to produce versatile engineering graduates who:

- 1) Will be successful and excel in their chosen career. Mechatronics graduates will be able to pursue positions that require design, development, analysis, control, and automation of mechatronics systems and processes.
- 2) Will be able to pursue graduate program, professional and/or continued education.
- 3) Will be responsible members of society through involvement in community and professional engagement.

## STUDENT LEARNING OUTCOMES

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The BS in Mechatronics Engineering program will provide knowledge and experience to students to deal with challenging engineering problems and enable them to design “intelligent” engineering components and systems. The graduates of this program should be able to demonstrate specific knowledge and skills prior to graduation. These abilities coincide with ABET criterion 3 (a) through (k) requirements as presented below:

- a) Graduates will demonstrate an ability to apply knowledge of mathematics, science, and engineering principles to analysis and design.
- b) Graduates will demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data in with the use of computer applications current to industry.
- c) Graduates will demonstrate an ability to design and apply creativity in the design of Mechatronics systems, components and process.
- d) Graduates will demonstrate an ability to function on multidisciplinary teams.
- e) Graduates will demonstrate an ability to identify, formulate, and solve engineering problems.
- f) Graduates will demonstrate an understanding of professional and ethical responsibility.
- g) Graduates will demonstrate an ability to communicate effectively the engineering ideas and results both orally and in writing.
- h) Graduates will develop the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- i) Graduates will demonstrate recognition of the need for quality, continuous improvement, and an ability to engage in life-long learning.
- j) Graduates will have a respect for diversity and knowledge of contemporary professional, societal and global issues.
- k) Graduates will demonstrate an appropriate mastery of the knowledge, techniques, skills, and modern tools used in the Mechatronics engineering field.