

# CLARK ATLANTA UNIVERSITY



## *Dual Degree in Engineering Program (DDEP)*

### Course Catalog

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## **PROGRAM OVERVIEW**

The Dual Degree in Engineering Program (DDEP) at Clark Atlanta University (CAU) addresses the under representation of African Americans in the sciences and engineering fields. The DDEP exposes undergraduate students to detailed engineering instruction coupled with research experience in state-of-the-art laboratories. It also promotes an applied research orientation, thus facilitating the technology transfer of basic scientific discoveries to marketable products and services.

The DDEP interdisciplinary and multidisciplinary curriculum is designed to provide students with a strong background in the physical sciences and mathematics, proficiency in oral and written communications, and a thorough foundation in fundamental engineering principles.

The goals and objectives of the DDEP are to produce engineers, industrial and scientific leaders and researchers capable of identifying, addressing, and solving technical problems which will not only benefit society but will also regain the nation's preeminence in science and technology.

The DDEP has linkages with several research institutions, government research laboratories, and industries to facilitate summer undergraduate research experience. CAU has been participating with the other Atlanta University Center (AUC) schools since 1969.

## **ADMISSION REQUIREMENTS**

CAU students with a declared major in Biology, Chemistry, Computer Science, Mathematics, or Physics and successful completion of required DDEP pre-engineering courses.

## **DEGREE REQUIREMENTS**

The Dual Degree Engineering Program (DDEP) provides the opportunity for students to obtain both an Art or Science degree from Clark Atlanta University (CAU) and an Engineering degree from a participating engineering institution. Students participating in the DDEP complete three academic years at CAU and two academic years at a participating engineering institution. In some cases the degree from the host engineering school may be a Master's in Engineering. The participating engineering institutions are Auburn University, Clarkson University; Columbia University; Dartmouth College; Georgia Institute of Technology; North Carolina A&T State University; Rensselaer Institute of Technology; Rochester Institute of Technology; University of Alabama, Huntsville; University of Florida, Gainesville; University of Michigan, Ann Arbor; and University of Missouri, Rolla. Engineering disciplines available at the participating engineering schools are shown in Table 1.

As a joint sponsor of the Atlanta University Center DDEP, CAU DDEP students can take advantage of services offered through the Atlanta University Center Dual-Degree Engineering Program Office. Services include scholarships, internships, permanent placement, career counseling and tutoring. In addition, CAU DDEP students are encouraged to join the Atlanta University Center chapter of the National Society of Black Engineers (NSBE). CAU students must register with the Atlanta University Center DDEP Office to be eligible for any of their services.

**Table 1  
Available Engineering Disciplines**

Major	Au	Bos	CLA	GIT	NC A&T	RPI	RIT	UA-H	UF-G	UM-A A	UM-R
Aerospace	x	x		x					x	x	x
Aeronautical			x			x					
Agricultural					x				x		
Architectural					x					x	x
Atmospheric										x	
Biological									x		
Biomechanical						x					
Biomedical		x		x					x	x	
Biomolecular				x							
Biosystems	x				x						
Chemical	x		x	x	x	x		x	x	x	x
Civil	x		x	x	x	x		x	x	x	x
Coastal									x		
Computer	x	x	x	x	x	x	x	x	x	x	x
Electrical	x	x	x	x	x	x	x	x	x	x	x
Electrical Power						x					
Engineering Physics						x					
Environmental			x	x	x	x			x	x	x
Fiber				x							
Information Science									x		
Industrial	x			x	x	x	x	x	x	x	
Macromolecular										x	
Manufacturing		x									x
Management						x					
Marine										x	
Materials Science				x		x			x	x	
Mechanical	x	x	x	x	x	x	x	x	x	x	x
Microelectronic							x				
Naval										x	
Nuclear						x			x	x	
Oceanic										x	
Operations										x	
Optical								x			
Polymer				x							
Radiological									x	x	
Software	x						x				
Space										x	
Systems	x			x	x	x	x	x	x		
Textile	x			x							

**CAU students have two options to complete the Dual Degree Engineering Program. These options include:**

### **B.S. (INTERDISCIPLINARY) SCIENCE OPTION**

The student will receive a Bachelor of Science degree from CAU with a major in the designated field/DDEP as well as a Bachelor's degree from the engineering institution. With this option, the student must complete the following:

- All CAU core curriculum requirements
- All required CAU pre-engineering courses
- All DDEP engineering requirements at the host Engineering institution

### **B.S. IN A SCIENCE MAJOR OPTION**

With this option, the student will pursue a degree in Biology, Chemistry, Computer Science, Mathematics and Physics and must complete the following:

- All CAU core curriculum requirements
- All required CAU pre-engineering courses
- All DDEP requirements for the chosen CAU science major
- All DDEP engineering requirements at the host Engineering institution

### **DDEP REQUIREMENTS:**

- Introduction to Engineering
- Engineering Graphics
- Calculus I, II, III
- Differential Equations
- Linear Algebra
- General Chemistry I, II
- Physics I, II, III
- Economics
- Introduction to Computer Programming (C++ or Java)

### **TRANSFER PROCESS:**

Each engineering institutions has documented admission guidelines that complies with ABET accreditation standard. These guidelines can be obtained during academic advisement sessions. A general guideline for admission is that the student maintains a cumulative and Math/Science grade point average of 3.0 or higher to ensure acceptance into the partnering institutions. The student should apply for transfer to the engineering institution about 6-9 months prior to his or her intended date of transfer. The transfer forms are handled through both the CAU DDEP office and the AUC DDEP office.

Students are encouraged to seek advisement prior to submitting any forms to the transfer institution. In some instances, application fees are waived.

CAU student should have major verification forms completed by their department advisors and the DDEP advisor prior to transfer. These forms will be forwarded to the Registrar's office by the advisor with CAU student transcript and the partner institution student transcript from the AUC DDEP office by the deadlines printed on the yearly calendar for graduation. The student should also complete a petition to march form for the yearly commencement ceremony and submit the form to the Office of Undergraduate Studies.

All students must be cleared through these offices before permission to participate in the yearly commencement ceremony. To ensure students are adequately informed attending academic advisement sessions are essential and sometimes critical to timely transition to the partner institution. Upon completion of all requirements at both institutions, the student is simultaneously awarded a Bachelor of Science degree from CAU and a Bachelor of Engineering.

## **GRADUATION REQUIREMENTS**

A Dual Degree Engineering (DDEP) student is eligible to graduate when he or she has met the following requirements:

- Completed the required courses for the DDEP
- Fulfilled the graduation requirements for CAU.
- Fulfilled the graduation requirements for the host engineering institution.

CAU students majoring in Biology, Chemistry, Computer Science, Mathematics, Physics or Business Administration, must complete all the major requirements or be within 2 classes of completing that major to be allowed to participate in the yearly commencement ceremony. If the student is a General Science major, then he or she must be certified by the engineering school to be within two courses of completing the engineering degree. With this option, the student will not be able to participate in the CAU Commencement Ceremony with his or her incoming class. Dual Degree Engineering students must complete an engineering major to graduate from the engineering institution.

Each DDEP student in residence at host engineering institutions must provide to the CAU DDEP Coordinator a copy of a current transcript at the end of each semester. During the spring semester prior to the year of anticipated graduation, each DDEP student must apply for graduation from CAU and is responsible for arranging for an official transcript to be forwarded from the host engineering institution to the Office of the CAU Registrar no later than the beginning of the spring semester of the anticipated year of graduation. All degree requirements must be completed in order for CAU students to participate in commencement activities.

### **DDEP PRE-ENGINEERING COURSE DESCRIPTION:**

Courses Common to all Engineering disciplines (Architectural, Biomedical, Chemical, Civil, Electrical, Mechanical Engineering, etc.)

**CEGR 101: Introduction to Engineering**  
**3 Semester-Hours**

Introduction to the engineering profession and various branches of engineering utilizing audio-visual material, lectures by visiting professionals and trips to plants and factories, emphasis on professionalism and ethics, engineering solutions, representation of technical information, engineering estimations and approximations, dimensions, units and conversions with introduction to statistics, mechanics, electrical theory and engineering economics.  
Prerequisite: CMAT 105.

### **CEGR 110: Engineering Graphics**

#### **3 Semester-Hours**

Introduction to engineering computer graphics and visual communication including freehand sketching, engineering design processes, 2D/3D and solid CAD models, development and interpretation of drawings, projection standards and specifications for product realization.  
Prerequisite: CMAT 105.

### **CEGR 201: Electrical Circuit Analysis**

#### **4 Semester-Hours**

This course is designed to enable students to analyze basic circuits and to understand more advanced circuits that have circuit elements such as resistors, capacitors, inductors, voltage and current sources (using Kirchoff's laws, mesh and nodal analysis, network theorems to DC and AC circuits and also by computer simulation using PSPICE software). Prerequisites: CMAT 112, CPHY 122.

### **CEGR 211: Engineering Statics**

#### **3 Semester-Hours**

Study of the elements of statics in two and three dimensions using vector algebra, laws of equilibrium applied to particles, rigid bodies and structures, friction, centroids. Prerequisites: CMAT 112, CPHY 121

### **CEGR 311: Engineering Dynamics**

#### **3 Semester-Hours**

Kinematics of rectilinear and curvilinear motion of particles, kinematics of rigid bodies in plane motion, kinetics (work and energy relations, impulse and momentum principles) of particles, systems of particles, and rigid bodies in plane motion. Prerequisite: CEGR 211.

### **CEGR 102: Introduction to Engineering Design**

#### **2 Semester-Hours**

Introduction to engineering design process and design concepts; applications to design problems in the various branches of engineering; practical design assignments.  
*Prerequisite: CMAT 105.*

### **CEGR 314: Matlab / Labview for Engineers**

#### **3 Semester-Hours**

Application of MathLab/Labview techniques to various engineering problems including numerical methods for solving nonlinear problems. Prerequisites: CMAT 112, 212.

### **NOTE FOR ENGINEERING MAJORS:**

- (1) Biomedical Engineering major, in order to obtain CAU Biology Degree must take BIO 111 and 112 (General Biology I and II) or equivalent.**
- (2) Chemical Engineering major, in order to obtain CAU Chemistry Degree must take CCHE231 and CCHE 341 (Organic Chemistry and Physical Chemistry) or equivalent.**
- (3) Chemical / Biomedical Engineering majors can substitute one Science or Engineering electives for each of the following courses, CEGR 311 - Engineering Dynamics, CEGR 201/20L – Electrical Circuit Analysis and CEGR 211 – Engineering Statics.**

- (4) **Computer, Electrical, Architectural, Mechanical, Civil Engineering and other Engineering majors must take CIS 121 and CCIS 123 (Introduction to Computer Systems and Data Structures) or equivalent to obtain CAU Computer Science Degree.**
- (5) **Electrical, Civil, Architectural and other Engineering majors must take CPHY 211 (Modern Physics) or equivalent to obtain CAU Physics degree.**
- (6) **Mechanical, Electrical, Civil, Architectural and other Engineering majors must take CMAT 321 (Probability and Statistics) or equivalent to obtain CAU Mathematics degree.**
- (7) **Students in the Dual Degree Engineering Program with a major in Biology, Chemistry, Computer Science, Physics and Mathematics may choose to substitute the appropriate 300-400 level courses from their technical institution's curriculum for the appropriate 300-400 level STEM courses at CAU. These substitutions are subject to the approval of the Department Chair.**

**Each semester, DDEP students must be advised by the DDEP Coordinator or designated DDEP advisor and the Department Chairperson for the STEM discipline in which students are majoring. Individualized programs will be conducted upon advisement. Please seek advisement as soon as possible.**

### **COURSE SEQUENCE CHECKLISTS**

Listed on the following pages is the recommended plan of study to assist DDEP students in developing their schedules. Students are strongly encouraged to meet with their advisor at a minimum of one session per semester.

### **DUAL DEGREE ENGINEERING RECOMMENDED PLANS OF STUDY**

<u>Course</u>	<u>Course Title</u>	<u>Semester- Hours</u>	<u>Semester and Year Completed</u>
<b>DUAL DEGREE ENGINEERING REQUIRED COURSES</b>			
<b>Freshman Year</b>			

<b>First Semester: 17 Semester-Hours</b>			
CGED 100	First Year Seminar	1	
CMAT 111	Calculus I	4	
CENG 105	English Composition I	3	
CEGR 101	Introduction to Engineering	3	
CEGR 101L	Introduction to Engineering Lab	0	
CSTA 101	Fundamentals of Speech	3	
	Elective	3	
<b>Second Semester: 18 Semester-Hours</b>			
CGED 101	First Year Seminar	1	
CMAT 112	Calculus II	4	
CENG 106	English Composition II	3	
CEGR 110	Engineering Graphics	3	
CEGR 110L	Engineering Graphics Lab	0	
CPHY 121	Physics I: Mechanics	3	
CPHY 121L	Physics I: Mechanics Lab	1	
CCIS 105	Structured Programming	3	
<b>Sophomore Year</b>			
<b>First Semester: 17 Semester-Hours</b>			
CMAT 211	Calculus III	4	
CCHE 111	General Chemistry I	4	
CPHY 122	Physics II: Electricity and Magnetism	3	
CPHY 122L	Physics II: Electricity and Magnetism Lab	1	
CEGR 102	Introduction to Engineering Design	2	
	Foreign Language Requirement	3	
<b>Second Semester: 17 Semester-Hours</b>			
CCHE 112	General Chemistry II	4	
CPHY 123	Physics III: Waves, Heat, & Light	3	
CPHY 123L	Physics III: Waves, Heat& Light Lab	1	
CMAT 212	Differential Equations	3	
CENG 201/2	Intro to World Literature I or II	3	
	Foreign Language Requirement	3	

<u>Course</u>	<u>Course Title</u>	<u>Semester-Hours</u>	<u>Semester and Year Completed</u>
<b>Junior Year</b>			
<b>First Semester: 17 Semester-Hours</b>			
CEGR 201	Electrical Circuit Analysis	3	
CEGR 201L	Electrical Circuit Analysis Lab	1	
CHIS 201	United States, Africa and World I	3	
CEGR 211	Engineering Statics	3	
CPSY 211	General Psychology	3	
CPED 101	Physical Education	1	
	Social Science Elective	3	
<b>Second Semester: 15 Semester-Hours</b>			
CHIS 202	United States, Africa and World II	3	
CEGR 311	Engineering Dynamics	3	
CMAT 214	Linear Algebra	3	
	Religion and Philosophy Elective	3	
	Humanities Elective	3	

## **CAU DDEP Contact Information**

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