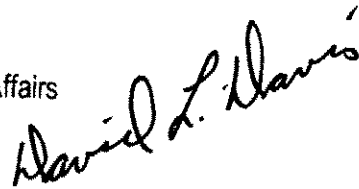


## MEMORANDUM

To: Dr. Martha Venn, Provost and Vice President for Academic Affairs

From: Dr. David L. Davis, Chair for Natural Science & Engineering



Date: October 9, 2012

Re: Approval of **Curriculum for the School of Science & Mathematics** for Middle Georgia State College

It is recommended by the Department of Natural Science & Engineering that the attached curriculum be approved by the Academic Affairs Committee and include in the Middle Georgia State College 2013 - 2014 catalog. The following programs are included in this document:

Program	Status of Program for MSC
Biology, B.S. Biology Track	Changed Program
Biology, B.S. Education Track	Changed Program
Biology, A.S.	Reactivated
Chemistry, A.S.	Changed Program
Engineering Technology, A.S.	Changed Program
Geology, A.S.	New Program
Physics, A.S.	Changed Program
Surveying, A.S.	New Program
Certificate Program in Surveying	New Program

The Curriculum Work Team in each program area were as follows:

**Biology:** Sharon Mozley-Standridge (MGC), Kirby Swenson (MGC), Gloria Huddleston (MGC), Clint Ready (MGC), Donna Balding (MSC), Dawn Sherry (MSC), John Pattillo (MSC)

**Chemistry:** Estelle Nuckles (MGC), Robert Zurales (MGC), Victoria Guarisco (MGC).

**Engineering Technology/Surveying:** Roger Purcell (MGC), Chris Hornung (MSC)

**Physics:** Imad El-Jeaid (MGC), Edwin Wallace (MGC), Malav Shah (MSC)

## **Biology (B.S.)**

### **Bachelor of Science Degree in Biology**

The broad field of biology offers diverse career opportunities to individuals with the appropriate training. The Bachelor of Science degree in biology is designed to prepare students planning to (1) attend professional and graduate school in health and biological science fields, (2) seek employment in industries using biologically related technology, or (3) teach biology in secondary schools. There are two tracks of study: the Biology track and the Biology Education track. The Biology track is appropriate for students planning to enter graduate programs in health sciences such as medicine, dentistry, physician's assistant, physical therapy, veterinary, and pharmacology as well as graduate programs in biological sciences. Students who choose not to continue on to a graduate program will have a strong biological science foundation for seeking employment in the biological science job market. The Biology Education track is designed to prepare students to teach biology in secondary schools. Both tracks will provide a student with a strong biological background preparing them to be successful in whichever career pathway they choose.

### **Curriculum for Bachelor of Science in Biology**

#### **Area A Credit: 9 Hours**

##### **Essential Skills**

- ENGL 1101 - English Composition I **Credit:** 3 hours
- ENGL 1102 - English Composition II **Credit:** 3 hours
- MATH 1112 – Plane Trigonometry **Credit:** 3 hours  
or
- MATH 1113 – Precalculus **Credit:** 4hours  
or
- MATH 1251 – Calculus I **Credit:** 4 hours

\*Note: Courses required for Area A must be completed within the first 30 hours. If a student takes MATH 1113 or MATH 1251 the addition hour credit will be applied to Area F or upper level curriculum. Students must have the necessary prerequisites for any course they choose.

#### **Area B Credit: 4 Hours**

##### **Institutional Options – To Be Determined**

#### **Area C Credit: 6 Hours**

##### **Humanities/Fine Arts**

- Literature Elective **Credit:** 3 hours
- Area C Elective **Credit:** 3 hours

#### **Area D Credit: 11 Hours**

##### **Science, Math and Technology**

- Lab Science Elective **Credit:** 4 hours  
CHEM 1211K, 1212K sequence is strongly recommended.
- Lab Science Elective **Credit:** 4 hours  
CHEM 1211K, 1212K sequence is strongly recommended.
- Area D Elective **Credit:** 3 hours  
MATH 1200 is strongly recommended.

### **Area E Credit: 12 Hours**

#### **Social Sciences**

- HIST 2111 - United States History to 1865 **Credit:** 3 hours  
or
- HIST 2112 – United States History since 1865 **Credit:** 3 hours
- POLS 1101 - American Government **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours  
Choose from the following:  
HIST 1111 - History of World Civilizations to 1650 **Credit:** 3 hours  
HIST 1112 - History of World Civilizations Since 1650 **Credit:** 3 hours  
POLS 2301 - Introduction to Comparative Politics **Credit:** 3 hours  
POLS 2401 - Introduction to Global Issues **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours

### **Area F Credit: 18 Hours**

#### **Major Field**

- BIOL 2107K - Principles of Biology I **Credit:** 4 hours
  - BIOL 2108K - Principles of Biology II **Credit:** 4 hours
  - BIOL 2998 - Research Methods **Credit:** 2 hours  
or
  - BIOL 2999 – Directed Studies in Biology **Credit:** 1 hour
  - CHEM 1211K - Principles of Chemistry I **Credit:** 4 hours
  - CHEM 1212K - Principles of Chemistry II **Credit:** 4 hours
- \*BIOL 2107K-2108K and CHEM 1211K-1212K are required in Area F if not taken in Area D. Students taking either the BIOL 2107K-2108K sequence or the CHEM 1211K-1212K sequence in Area D should take CHEM 2211K-2212K in Area F.

**Total Credit: 60 Hours**

## Upper Division Core Courses Required for Bachelor of Science in Biology Program

**\*\*Choose either Biology Track or Biology Education Track\*\***

### **Biology Track Credit: 60 Hours**

#### **Upper Level Core Credit: 22 Hours**

- BIOL 3104K - Cell Biology **Credit: 4 hours**
- BIOL 3211- Evolution **Credit: 4 hours**
- BIOL 3310K - Biochemistry **Credit: 4 hours**
- BIOL 3510K - Invertebrate Zoology **Credit: 4 hours**  
or
- BIOL 3520K - Vertebrate Zoology **Credit: 4 hours**  
or
- BIOL 3360K – Plant Biology **Credit: 4 hours**
- or
- BIOL 3510K - Invertebrate Zoology **Credit: 4 hours**
- BIOL 4110K - Genetics **Credit: 4 hours**
- BIOL 4120 – Senior Seminar **Credit: 2 hours**  
or
- BIOL 4894 – Research **Credit: 2 hours**

#### **Required Credit: 20 Hours**

- BIOL 4530K - Molecular Biology **Credit: 4 hours**
- BIOL 3540K - Microbiology **Credit: 4 hours**
- MATH 1251 - Calculus I **Credit: 4 hours**  
\*If MATH 1251 is used in Area A then students should take MATH 2252 or a 4 hour 3000 – 4000 level courses with a BIOL prefix  
and either
- CHEM 2211K - Organic Chemistry I **Credit: 4 hours**
- CHEM 2212K - Organic Chemistry II **Credit: 4 hours**  
or
- PHYS 1111K - Introductory Physics I **Credit: 4 hours**
- PHYS 1112K - Introductory Physics II **Credit: 4 hours**

#### **Electives Credit: 18 Hours**

Select 18 hours from the following:

- BIOL 3113 – Environmental Science **Credit: 3 hours**
- BIOL 3115K - Parasitology **Credit: 4 hours**
- BIOL 3130 – Ethical Issues in Science **Credit: 3 hours**
- BIOL 3350K - Ecology **Credit: 4 hours**
- BIOL 3360K - Plant Biology **Credit: 4 hours**
- BIOL 3510K - Invertebrate Zoology **Credit: 4 hours**
- BIOL 3520K - Vertebrate Zoology **Credit: 4 hours**
- BIOL 3710K - Animal Physiology **Credit: 4 hours**
- BIOL 3666K – Entomology **Credit: 4 hours**

- BIOL 4120 – Senior Seminar **Credit:** 2 hours
- BIOL 4150 – Tropical Ecology Studies **Credit:** 4 hours
- BIOL 4321 – Special Topics **Credit:** 2 – 4 hours
- BIOL 4344K - Comparative Vertebrate Anatomy **Credit:** 4 hours
- BIOL 4500 – Immunology **Credit:** 3 hours
- BIOL 4667K – Histology **Credit:** 4 hours
- BIOL 4450K – Mycology **Credit:** 4 hours
- BIOL 4454K Developmental Biology **Credit:** 4 hours
- BIOL 4774 – Field Biology **Credit:** 4 hours
- BIOL 4894 - Research **Credit:** 2 – 4 hours

**Total Hours: 120**

**Biology Education Track Credit: 67 Hours**

**Required Courses Credit: 34 Hours**

- BIOL 3104K - Cell Biology **Credit:** 4 hours
- BIOL 3211- Evolution **Credit:** 4 hours
- BIOL 3310K - Biochemistry **Credit:** 4 hours
- BIOL 3350K - Ecology **Credit:** 4 hours
- BIOL 3360K - Plant Biology **Credit:** 4 hours
- or
- BIOL 3510K - Invertebrate Zoology **Credit:** 4 hours
- or
- BIOL 3520K - Vertebrate Zoology **Credit:** 4 hours
- BIOL 4110K - Genetics **Credit:** 4 hours
- BIOL 4120 - Senior Seminar **Credit:** 2 hours
- or
- BIOL 4894 Research **Credit:** 2 - 4 hours
- SCIE 3002K - General Science for Secondary Education **Credit:** 4 hours

**Education Courses Credit: 33 Hours**

Students must be admitted to the Secondary Education Certification Track before taking upper division education courses.

- EDUC 2110 - Investigating Critical and Contemporary Issues in Education **Credit:** 3 hours
- EDUC 2120 - Exploring Socio-Cultural Perspectives on Diversity in Educational Contexts **Credit:** 3 hours
- EDUC 2130 - Exploring Learning and Teaching **Credit:** 3 hours
- EDUC 3401 - Explorations into Teaching: A Room With A View **Credit:** 1 hour
- EDUC 3402 - Making Classroom Connections **Credit:** 2 hours
- EDUC 3550 - Assessment for Learning **Credit:** 3 hours
- EDUC 3700 - Teaching/Learning in Secondary Science Environments **Credit:** 4 hours
- EDUC 3702 - Internship in Secondary Biology **Credit:** 3 hours
- EDUC 4704 - Student Teaching Secondary Biology **Credit:** 8 hours
- SPED 3110 - Introduction to the Exceptional Learner **Credit:** 3 hours

**Total Hours: 127**

## **Biology (A.S.)**

### **Transfer Program in Biology Leading to an Associate of Science**

#### **Area A Credit: 9 Hours**

##### **Essential Skills**

- ENGL 1101 - English Composition I **Credit: 3 hours**
- ENGL 1102 - English Composition II **Credit: 3 hours**
- MATH 1112 – Plane Trigonometry **Credit: 3 hours**  
or
- MATH 1113 – Precalculus **Credit: 4 hours**  
or
- MATH 1251 – Calculus I **Credit: 4 hours**

\*Note: Courses required for Area A must be completed within the first 30 hours. If a student takes MATH 1113 or MATH 1251 the additional hour credit will be applied to Area F or upper level curriculum. Students must have the necessary prerequisites for any course they choose.

#### **Area B Credit: 4 Hours**

##### **Institutional Options – To Be Determined**

#### **Area C Credit: 6 Hours**

##### **Humanities/Fine Arts**

- Literature Elective **Credit: 3 hours**
- Area C Elective **Credit: 3 hours**

#### **Area D Credit: 11 Hours**

##### **Science, Math and Technology**

- Lab Science Elective **Credit: 4 hours**  
CHEM 1211K, 1212K sequence is strongly recommended.
- Lab Science Elective **Credit: 4 hours**  
CHEM 1211K, 1212K sequence is strongly recommended.
- Area D Elective **Credit: 3 hours**  
MATH 1200 is strongly recommended.

#### **Area E Credit: 12 Hours**

##### **Social Sciences**

- HIST 2111 - United States History to 1865 **Credit: 3 hours**  
or
- HIST 2112 – United States History since 1865 **Credit: 3 hours**
- POLS 1101 - American Government **Credit: 3 hours**
- Area E Elective **Credit: 3 hours**  
Choose from the following:  
HIST 1111 - History of World Civilizations to 1650 **Credit: 3 hours**  
HIST 1112 - History of World Civilizations Since 1650 **Credit: 3 hours**  
POLS 2301 - Introduction to Comparative Politics **Credit: 3 hours**  
POLS 2401 - Introduction to Global Issues **Credit: 3 hours**
- Area E Elective **Credit: 3 hours**

#### **Area F Credit: 18 Hours**

##### **Major Field**

- BIOL 2107K - Principles of Biology I **Credit: 4 hours**
- BIOL 2108K - Principles of Biology II **Credit: 4 hours**

- BIOL 2998 - Research Methods **Credit:** 2 hours  
or
  - BIOL 2999 – Directed Studies in Biology **Credit:** 1 hour
  - CHEM 1211K - Principles of Chemistry I **Credit:** 4 hours
  - CHEM 1212K - Principles of Chemistry II **Credit:** 4 hours
- \*BIOL 2107K-2108K and CHEM 1211K-1212K are required in Area F if not taken in Area D. Students taking either the BIOL 2107K-2108K sequence or the CHEM 1211K-1212K sequence in Area D should take CHEM 2211K-2212K in Area F.

**Total Credit: 60 Hours**

## Chemistry (A.S.)

### Transfer Program in Chemistry Leading to Associate of Science

#### Area A Credit: 9 Hours

##### Essential Skills

- ENGL 1101 - English Composition I **Credit:** 3 hours
- ENGL 1102 - English Composition II **Credit:** 3 hours
- MATH 1112 – Plane Trigonometry **Credit:** 3 hours

or

- MATH 1113 – Precalculus **Credit:** 4 hours

or

- MATH 1251 – Calculus **Credit:** 4 hours

\*Note: Course required for Area A must be completed within the first 30 hours. If students choose to take a 4 hour course, then one hour credit from this course will count in Area F where applicable.

#### Area B Credit: 4 Hours

##### Institutional Options – To Be determined

#### Area C Credit: 6 hours

##### Humanities/Fine Arts

- Literature Elective **Credit:** 3 hours
- Area C Elective **Credit:** 3 hours

#### Area D Credit: 11 Hours

##### Science, Math and Technology

- Lab Science Elective **Credit:** 4 hours  
CHEM 1211K – 1212K sequence is strongly recommended.
- Lab Science Elective **Credit:** 4 hours  
CHEM 1211K – 1212K sequence is strongly recommended.
- Area D Elective **Credit:** 3 hours

MATH 1251 is strongly recommend

\*If MATH 1251 is used in Area A, then MATH 2252 is strongly recommended. If students choose to take a 4 hour course, then one hour credit from this course will count in Area F where applicable

#### Area E Credit: 12 Hours

##### Social Sciences

- HIST 2111 - United States History to 1865 **Credit:** 3 hours
- or
- HIST 2112 – United States History since 1865 **Credit:** 3 hours
  - POLS 1101 - American Government **Credit:** 3 hours
  - Area E Elective **Credit:** 3 hours

Choose from the following:

HIST 1111 - History of World Civilizations to 1650 **Credit:** 3 hours

HIST 1112 - History of World Civilizations Since 1650 **Credit:** 3 hours



POLS 2301 - Introduction to Comparative Politics **Credit:** 3 hours

POLS 2401 - Introduction to Global Issues **Credit:** 3 hours

- Area E Elective **Credit:** 3 hours

**Area F Credit: 18 Hours**

**Major Field**

- PHYS 2211K - Principles of Physics I **Credit:** 4 hours
- PHYS 2212K - Principles of Physics II **Credit:** 4 hours
- CHEM 2211K - Organic Chemistry I **Credit:** 4 hours
- CHEM 2212K - Organic Chemistry II **Credit:** 4 hours
- CHEM 2999 - Special Topics in Chemistry **Credit:** 2 hours  
or
- Major Elective **Credit:** 2 hours  
Select from MATH 2252, 2253, 2260, 2270

**Total Hours: 60**

## Engineering Technology (A.S.)

### Transfer Program in Engineering Technology Leading to Associate of Science

#### Area A Credit: 9 Hours

##### Essential Skills

- ENGL 1101 - English Composition I **Credit:** 3 hours
- ENGL 1102 - English Composition II **Credit:** 3 hours
- MATH 1112 – Plane Trigonometry **Credit:** 3hours  
or
- MATH 1113 – Precalculus **Credit:** 4 hours  
or
- MATH 1251 – Calculus I **Credit:** 4 hours

\*Note: Courses required for Area A must be completed within the first 30 hours. If students choose to take a 4 hour course, then one hour credit from this course will count in Area F where applicable

#### Area B Credit: 4 Hours

##### Institutional Options – To Be Determined

#### Area C Credit: 6 hours

##### Humanities/Fine Arts

- Literature Elective **Credit:** 3 hours
- Area C Elective **Credit:** 3 hours

#### Area D Credit: 11 Hours

##### Science, Math and Technology

- Lab Science Elective **Credit:** 4 hours  
Select either PHYS 1111K - 1112K or PHYS 2211K - 2212K is strongly recommend
- Lab Science Elective **Credit:** 4 hours  
Select either PHYS 1111K - 1112K or PHYS 2211K - 2212K is strongly recommend.
- Area D Elective **Credit:** 3 hours

\*MATH 1251 - Calculus I **Credit:** 4 hours is strongly recommended

\* If students use MATH 1251 in area A, then MATH 2252 is strongly recommended. If students choose to take a 4 hour course, then one hour credit from this course will count in Area F where applicable

#### Area E Credit: 12 Hours

##### Social Sciences

- HIST 2111 - United States History to 1865 **Credit:** 3 hours  
or
- HIST 2112 – United States History since 1865 **Credit:** 3 hours
- POLS 1101 - American Government **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours  
Choose from the following:  
HIST 1111 - History of World Civilizations to 1650 **Credit:** 3 hours  
HIST 1112 - History of World Civilizations Since 1650 **Credit:** 3 hours  
POLS 2301 - Introduction to Comparative Politics **Credit:** 3 hours  
POLS 2401 - Introduction to Global Issues **Credit:** 3 hours

- Area E Elective **Credit:** 3 hours

**Area F Credit: 18 Hours**

**Major Field**

- ENGR 1001K – Introduction to Engineering **Credit:** 3 hours
- ENGR 1002 – Engineering Design Graphics **Credit:** 3 hours
- MATH 2252 - Calculus II **Credit:** 4 hours
- \*MATH 2253- Calculus III **Credit:** 4 hours may be used if student has the prerequisites.  
Choose two from the following: 6- 8 Credit hours
- CHEM 1211K – Principles of Chemistry **Credit:** 4 hours
- ENGR 1100K – Introduction to Computer Engineering **Credit:** 3 hours
- ENGL 2208 – Technical Communication **Credit:** 3 hours
- ENGR 2210 – Engineering Statics **Credit:** 3 hours
- ENGR 2220 - Dynamics **Credit:** 3 hours
- ENGR 2230 - Mechanics of Deformable Bodies **Credit:** 3 hours
- ENGR 2300 - Principle of Engineering Economics **Credit:** 3 hours
- ENGR 2500 - Surveying and Geomatics **Credit:** 4 hours
- Mathematics overflow from Areas A & D

**Total Hours: 61 - 62**

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## **GEOLOGY (A.S.)**

### **Transfer Program in Geology Leading to Associate of Science**

#### **Area A Credit: 9 hours**

##### **Essential Skills**

- ENGL 1101 - English Composition I **Credit: 3 hours**
  - ENGL 1102 - English Composition II **Credit: 3 hours**
  - MATH 1112 – Plane Trigonometry **Credit: 3 hours**
- or
- MATH 1113 – Precalculus **Credit: 4 hours**

\*Note: Courses required for Area A must be completed within the first 30 hours. If a student takes MATH 1113 the additional hour credit will be applied to Area F where applicable.

#### **Area B Credit: 4 Hours**

**Institutional Options – To Be Determined Later**

#### **Area C Credit: 6 Hours**

##### **Humanities/Fine Arts**

- Literature Elective **Credit: 3 hours**
- Area C Elective **Credit: 3 hours**

#### **Area D Credit: 11 Hours**

##### **Science, Math and Technology**

- Lab Science Elective **Credit: 4 hours**  
CHEM 1211K - 1212K sequence is strongly recommended.
- Lab Science Elective **Credit: 4 hours**  
CHEM 1211K - 1212K sequence is strongly recommended.
- Area D Elective **Credit: 3 hours**  
Choose one of the following:  
BIOL 2107K - Principles of Biology I **Credit: 4 hours**  
CHEM 2241K - Organic Chemistry I **Credit: 4 hours**  
MATH 2252 - Calculus II **Credit: 4 hours**  
PHYS 1111K - Introductory Physics I **Credit: 4 hours**  
\*Not allowed if PHYS 2211K, 2212K are taken  
PHYS 2211K – Principles of Physics I **Credit: 4 hours**  
\*Not allowed if PHYS 1111K, 1112K are taken  
\*Additional hour of credit will be applied to Area F where applicable.

#### **Area E: Credit: 12 Hours**

##### **Social Sciences**

- HIST 2111 - United States History to 1865 **Credit: 3 hours**
- or

- HIST 2112 – United States History since 1865 **Credit:** 3 hours
- POLS 1101 - American Government **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours

Choose from the following:

HIST 1111 - History of World Civilizations to 1650 **Credit:** 3 hours

HIST 1112 - History of World Civilizations Since 1650 **Credit:** 3 hours

POLS 2301 - Introduction to Comparative Politics **Credit:** 3 hours

POLS 2401 - Introduction to Global Issues **Credit:** 3 hours

- Area E Elective **Credit:** 3 hours

### **Area F: 18 Credit Hours**

#### **Major Field**

- GEOL 1125K – Physical Geology **Credit:** 4 hours
- GEOL 1126K - Physical Historical Geology **Credit:** 4 hours
- MATH 1251 - Calculus I **Credit:** 4 hours

Choose one from the following: **Credit:** 4 hours

BIOL 2107K - Principles of Biology I **Credit:** 4 hours

BIOL 2108K - Principles of Biology II **Credit:** 4 hours

PHYS 1111K - Introductory Physics I **Credit:** 4 hours

PHYS 1112K - Introductory Physics II **Credit:** 4 hours

- Overflow from Areas A and D **Credit:** 2 hours

**Total Credit: 60 hours**

## Physics (A.S.)

### Transfer Program in Physics Leading to Associate of Science

#### Area A Credit: 9 Hours

##### Essential Skills

- ENGL 1101 - English Composition I **Credit:** 3 hours
- ENGL 1102 - English Composition II **Credit:** 3 hours MATH 1112 – Plane Trigonometry **Credit:** 4 hours
- MATH 1112 – Plane Trigonometry **Credit:** 3 hours  
or
- MATH 1113 – Precalculus **Credit:** 4 hours
- or
- MATH 1251 – Calculus I **Credit:** 4 hours

\*Note: Courses required for Area A must be completed within the first 30 hours. If students choose to take a 4 hour course, then one hour credit from this course will count in Area F where applicable.

#### Area B Credit: 4 Hours

##### Institutional Options – To Be Determined

#### Area C Credit: 6 hours

##### Humanities/Fine Arts

- Literature Elective **Credit:** 3 hours
- Area C Elective **Credit:** 3 hours

#### Area D Credit: 11 Hours

##### Science, Math and Technology

- Lab Science Elective **Credit:** 4 hours  
CHEM 1211K - 1212K sequence is strongly recommended.
- Lab Science Elective **Credit:** 4 hours  
CHEM 1211K - 1212K sequence is strongly recommended.
- Area D Elective **Credit:** 3 hours  
MATH 1251 or MATH 2252 is strongly recommended

\* If students choose to take a 4 hour course, then one hour credit from this course will count in Area F where applicable

#### Area E Credit: 12 Hours

##### Social Sciences

- HIST 2111 - United States History to 1865 **Credit:** 3 hours  
or
- HIST 2112 – United States History since 1865 **Credit:** 3 hours
- POLS 1101 - American Government **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours  
Choose from the following:  
HIST 1111 - History of World Civilizations to 1650 **Credit:** 3 hours  
HIST 1112 - History of World Civilizations Since 1650 **Credit:** 3 hours  
POLS 2301 - Introduction to Comparative Politics **Credit:** 3 hours  
POLS 2401 - Introduction to Global Issues **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours

**Area F Credit: 18 Hours**

**Major Field**

- MATH 2252 - Calculus II **Credit:** 4 hours  
\*If student uses MATH 2252 in Area D then student should use MATH 2260 or MATH 2270 as substitution.
- MATH 2253 - Calculus III **Credit:** 4 hours
- PHYS 2211K - Principles of Physics I **Credit:** 4 hours
- PHYS 2212K - Principles of Physics II **Credit:** 4 hours
- Major Elective **Credit:** 2 hour: Select from CPSC 1301, 1302, MATH 2260, 2270, or PHYS 2999.

**Total Hours: 60**

## Engineering Studies & Surveying-Geomatics Program

### General Information

#### Engineering vs. Engineering Technology

According to the National Society of Professional Engineers:

*"The distinction between engineering and engineering technology emanates primarily from differences in their educational programs. Engineering programs are geared toward development of conceptual skills, and consist of a sequence of engineering fundamentals and design courses, built on a foundation of complex mathematics and science courses. Engineering technology programs are oriented toward application, and provide their students introductory mathematics and science courses, and only a qualitative introduction to engineering fundamentals. Thus, engineering programs provide their graduates a breadth and depth of knowledge that allows them to function as designers. Engineering technology programs prepare their graduates to apply others' designs."*

Also, from the University of North Carolina at Charlotte:

<b>Engineering Technology</b>	<b>Engineering</b>
An engineering technology (ET) graduate is an implementer.	An engineering graduate is an innovator.
Emphasis of curriculum is on applying current knowledge and practices to the solution of specific technical problems and standard design problems. Students engage discipline topics early in the freshman and sophomore years.	Emphasis of curriculum is on developing new methods of analysis and solutions for open-ended, complex and unique design problems. Most discipline study occurs in the junior and senior years.
New graduates would most likely enter industry in construction, product design, development, testing, technical operations, or technical services and sales.	New graduates would most likely aspire to an entry-level position in conceptual design, systems engineering, product research or development.
Graduates are readily accepted into graduate school and often pursue graduate study in Construction & Facilities Management, Fire Protection & Administration, engineering management, business administration, or similar programs.	Graduates are readily accepted to graduate school for advanced study in engineering.
Graduates are eligible for professional registration in <u>most</u> states with wide variation in licensing requirements.	Graduates are eligible for professional registration in <u>all</u> states through examination and documented experience.
More likely to get a 'hands-on' laboratory, testing, construction, or in-the-field job.	More likely to get a research, development, or design job.
Coursework includes algebra, trigonometry, applied calculus and college level sciences; level of math is not as in-depth as engineering programs while focusing on applications of the engineering disciplines in the freshmen and sophomore years of study. Students planning on subsequent graduate study often take additional mathematics as part of their undergraduate preparation.	Coursework includes multiple semesters of calculus and calculus-based theoretical university level science courses during the first two years followed by engineering science, analysis and design in the junior and senior years.

The Engineering Studies & Surveying-Geomatics Program at Middle Georgia State College (MGSC) offers an Associate of Science degree in Engineering Technology and in Surveying (online) as well as an online eighteen hour certificate in Surveying (Land Surveying). MGSC also participates in the Regents Engineering Transfer Program (RETP) with Georgia Tech (for more information go to: [Georgia Tech Transfer Admission Guidelines](#) and [Georgia Tech RETP Admission Requirements &](#)



Procedures). Please note that the RETP program is not a degree program but a curriculum of courses designed to make transfer as an engineering student to Georgia Tech as seamless as possible. The instructors at MGSC are committed to teaching and preparing students to meet the challenges of further education and career development in engineering and surveying-geomatics as required by an increasingly technological society.

### **Regents' Engineering Transfer Program (RETP)**

Qualified students seeking a Bachelor of Engineering degree may begin their college studies at Macon State College through the Regents' Engineering Transfer Program (RETP). Upon successful completion of the RETP, students may transfer to the Georgia Institute of Technology to complete the degree requirements. It is expected that students in this program, like other Georgia Tech graduates, will normally require four to five and one-half years to complete the degree requirements, depending on their pre-college preparation, involvement in extracurricular activities, and engineering major.

To be admitted to the Regents' Engineering Transfer Program at Macon State College, applicants must present proof of acceptance at Georgia Tech or have achieved at least:

1. A combined SAT score of at least 1090 (including a minimum of 560 on the math and 440 on the verbal portion) and
2. A high school GPA of at least 3.0

Students who do not meet the initial admission criteria may qualify for the RETP after the end of their freshman year by:

1. Completing the first chemistry and the first physics courses and Calculus I and II (CHEM 1211K, PHYS 2111K, MATH 1251 and 2252) with grades of 3.0 (B) or higher, and
2. Attaining a cumulative grade point average of 3.0 or higher.

Finally, students who complete the courses included in the first two years of the desired Tech engineering program with a GPA of 2.7 or higher in those courses may be admitted to the RETP at the discretion of the Georgia Tech RETP coordinator.

The Macon State College faculty members have worked closely with the Georgia Tech faculty to assure a curriculum which is well coordinated with that of Georgia Tech. Specific dates have been established for students to visit the Georgia Tech campus and meet with representatives of their anticipated Georgia Tech major.

Regents' Engineering Transfer Program students who satisfactorily complete the RETP curriculum and apply for transfer will be accepted to Georgia Tech. However, admission to the most popular majors, as for other Georgia Tech students, will be based upon overall grade point average, performance in the required prerequisite courses, and availability of student spaces.

### **Engineering Transfer \ Engineering Technology**

Students who wish to transfer to other engineering\engineering technology institutions besides Georgia Tech, or who want to facilitate a general transfer to Georgia Tech, or who are not initially eligible for the MGSC-RETP program are also encouraged to enter MGSC's engineering transfer curriculum. Students interested in completing an Engineering B.S. degree can typically complete their first two years study at MGSC and then transfer to their selected senior college to complete their four-year degree. Most students interested in pursuing a degree in engineering enroll as Physics majors at MGSC. The first two years of Physics majors' curriculum is very similar to those of an engineering student. The MGSC engineering faculty members will work closely with the pre-engineering students to assure that their curriculum at MGSC is coordinated with their desired major at the senior college of the student's choice. Currently, in addition to Georgia Tech, the University System of Georgia institutions offering four year degrees in various engineering/engineering technology disciplines include: Georgia Southern University, Fort Valley State University, Savannah State University, Southern Polytechnic State University and the University of Georgia. Mercer University is a private institution which also offers four year engineering degrees in various disciplines.

## Required Engineering Transfer Coursework

### MGSC Courses Required of All Students Interested Engineering

- CHEM 1211K - Principles of Chemistry I **Credit:** 4 hours
- ENGL 1101 - English Composition I **Credit:** 3 hours
- ENGL 1102 - English Composition II **Credit:** 3 hours
- MATH 1251 - Calculus I **Credit:** 4 hours
- MATH 2252 - Calculus II **Credit:** 4 hours
- MATH 2253 - Calculus III **Credit:** 4 hours
- PHYS 2211K – Principles of Physics I **Credit:** 4 hours
- PHYS 2212K - Principles of Physics II **Credit:** 4 hours
- Humanities – See Area C and senior college specific requirements **Credit:** 6 hours
- Social Sciences – See Area E and senior college specific requirements **Credit:** 12 hours
- HLTH 1101 Health **Credit:** 2 hours

Students are strongly encouraged to go to the senior college's website and research specific curriculum requirements as well as transfer credits.

### MGSC Courses Required of All RETP Students

- CHEM 1211K - Principles of Chemistry I **Credit:** 4 hours
- ENGL 1101 - English Composition I **Credit:** 3 hours
- ENGL 1102 - English Composition II **Credit:** 3 hours
- ENGR 1001 - Introduction to Engineering **Credit:** 3 hours
- MATH 1251 - Calculus I **Credit:** 4 hours
- ENGR 1371 - Computing for Engineers **Credit:** 4 hours
- or
- MATH 1371 - Computing for the Mathematical Sciences **Credit:** 4 hours
- MATH 2252 - Calculus II **Credit:** 4 hours
- MATH 2253 - Calculus III **Credit:** 4 hours
- MATH 2260 – Introduction to Linear Algebra **Credit:** 3 hours
- PHYS 2211K – Principles of Physics I **Credit:** 4 hours
- PHYS 2212K - Principles of Physics II **Credit:** 4 hours

In addition to the required and elective courses, students may also complete Humanities, Social Science and lower level Engineering requirements by taking Humanities, Social Science and Engineering courses while at MGSC. Students are strongly encouraged to go to the appropriate Georgia Tech engineering school's website and research specific curriculum requirements as well as transfer credits.

## Surveying-Geomatics

Middle Georgia State College offers an Associate Degree in Surveying and an eighteen hour Certificate in Surveying as well. The surveying courses provided in these programs are approved by the Georgia Board of Professional Engineers and Land Surveyors to meet the education requirements for licensure as a Land Surveyor-in Training /Registered Land Surveyor in the

State of Georgia. The Surveying Certificate offering began in 1994 and over 300 students have completed the certificate or required courses resulting in over 135 Land Surveyors in Training and over 150 Registered Land Surveyors.

## **Surveying (A.S.)**

### **Program in Surveying Leading to Associate of Science**

#### **Area A Credit: 9 Hours**

##### **Essential Skills**

- ENGL 1101 – English Composition I **Credit:** 3 hours
- ENGL 1102 – English Composition II **Credit:** 3 hours
- MATH 1112 – Plane Trigonometry **Credit:** 3 hours  
or
- MATH 1113 – Precalculus **Credit:** 4 hours  
\*Math 1251 Calculus I may be used if a student has required prerequisites.  
\*Note: Courses required for Area A must be completed within the first 30 hours

#### **Area B Credit: 4 Hours**

##### **Institutional Options -- To Be Determined**

#### **Area C Credit: 6 Hours**

##### **Humanities/Fine Arts**

- Literature Elective **Credit:** 3 hours
- Area C Elective **Credit:** 3 hours

#### **Area D Credit: 11 Hours**

##### **Science, Math and Technology**

- Lab Science Elective **Credit:** 4 hours  
Select either PHYS 1111K - 1112K or PHYS 2211K - 2212K is strongly recommend
- Lab Science Elective **Credit:** 4 hours  
Select either PHYS 1111K - 1112K or PHYS 2211K - 2212K is strongly recommend.
- Area D Elective **Credit:** 3 hours  
MATH 1251 is strongly recommended. Math 2252 Calculus II may be used if a student has required prerequisites.

#### **Area E: Credit: 12 Hours**

##### **Social Sciences**

- HIST 2111 - United States History to 1865 **Credit:** 3 hours  
or
- HIST 2112 – United States History since 1865 **Credit:** 3 hours
- POLS 1101 - American Government **Credit:** 3 hours
- Area E Elective **Credit:** 3 hours  
Choose from the following:  
HIST 1111 - History of World Civilizations to 1650 **Credit:** 3 hours  
HIST 1112 - History of World Civilizations Since 1650 **Credit:** 3 hours

POLS 2301 - Introduction to Comparative Politics **Credit:** 3 hours

POLS 2401 - Introduction to Global Issues **Credit:** 3 hours

**Area F Credit: 18 Hours**

**Major Field**

- SURV 1504 - Fluid Mechanics for Surveyors **Credit:** 3 hours
- SURV 2501 - Plane Surveying **Credit:** 3 hours
- SURV 2502 - Advanced Surveying **Credit:** 3 hours
- SURV 2503 - Surveying Laws **Credit:** 3 hours
- SURV 2504 - Hydrology for Surveyors **Credit:** 3 hours
- SURV 2506 - Drainage and Erosion Control **Credit:** 3 hours

**Total Credit: 63 – 64 Hours**

**Curriculum for the Certificate Program in Surveying**

- SURV 2501 - Plane Surveying **Credit:** 3 hours
  - SURV 2502 - Advanced Surveying **Credit:** 3 hours
  - SURV 2503 - Surveying Laws **Credit:** 3 hours
  - SURV 2504 - Hydrology for Surveyors **Credit:** 3 hours
- Choose two from the following:
- SURV 1500 - Elementary Surveying Calculations **Credit:** 3 hours
  - SURV 1504 - Fluid Mechanics for Surveyors **Credit:** 3 hours
  - SURV 1521 - Surveying Graphics **Credit:** 3 hours

**Total Credits: 18 Hours**