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 the 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:

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</thead>
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<tr>
<td>Biology, B.S. Biology Track</td>
<td>Changed Program</td>
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<tr>
<td>Biology, B.S. Education Track</td>
<td>Changed Program</td>
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<td>Biology, A.S.</td>
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<tr>
<td>Chemistry, A.S.</td>
<td>Changed Program</td>
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<td>Engineering Technology, A.S.</td>
<td>Changed Program</td>
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<td>Geology, A.S.</td>
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<td>Physics, A.S.</td>
<td>New Program</td>
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<td>Surveying, A.S.</td>
<td>Changed Program</td>
</tr>
<tr>
<td>Certificate Program in Surveying</td>
<td>New Program</td>
</tr>
</tbody>
</table>

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)

VPAA Office 7/6/2009
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: 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 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 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 F 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 F 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 Elective **Credit: 3 hours**

**Area G 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 - Pre-Calculus 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 recommended

*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: 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
  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 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
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 - Pre-calculus 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 F 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 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:

<table>
<thead>
<tr>
<th>Engineering Technology</th>
<th>Engineering</th>
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<tbody>
<tr>
<td>An engineering technology (ET) graduate is an implementer.</td>
<td>An engineering graduate is an innovator.</td>
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<td>Emphasis of curriculum is on applying current knowledge</td>
<td>Emphasis of curriculum is on developing new methods</td>
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<td>and practices to the solution of specific technical</td>
<td>of analysis and solutions for open-ended, complex and</td>
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<td>problems and standard design problems. Students engage</td>
<td>unique design problems. Most discipline study occurs</td>
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<td>discipline topics early in the freshman and sophomore years.</td>
<td>in the junior and senior years.</td>
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<td>New graduates would most likely enter industry in</td>
<td>New graduates would most likely aspire to an entry-level</td>
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<td>construction, product design, development, testing,</td>
<td>position in conceptual design, systems engineering,</td>
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<td>technical operations, or technical services and sales.</td>
<td>product research or development.</td>
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<td>Graduates are readily accepted into graduate school and</td>
<td>Graduates are readily accepted to graduate school for</td>
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<td>often pursue graduate study in Construction &amp; Facilities</td>
<td>advanced study in engineering.</td>
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<td>Management, Fire Protection &amp; Administration, engineering</td>
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<td>management, business administration, or similar programs.</td>
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<td>Graduates are eligible for professional registration in</td>
<td>Graduates are eligible for professional registration in</td>
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<td>most states with wide variation in licensing requirements.</td>
<td>all states through examination and documented experience.</td>
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<td>More likely to get a 'hands-on' laboratory, testing,</td>
<td>More likely to get a research, development, or design</td>
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<td>construction, or in-the-field job.</td>
<td>job.</td>
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<td>Coursework includes algebra, trigonometry, applied</td>
<td>Coursework includes multiple semesters of calculus and</td>
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<td>calculus and college level sciences; level of math is not</td>
<td>calculus-based theoretical university level science</td>
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<td>as in-depth as engineering programs while focusing on</td>
<td>courses during the first two years followed by</td>
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<td>applications of the engineering disciplines in the freshmen</td>
<td>engineering science, analysis and design in the</td>
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<td>and sophomore years of study. Students planning on</td>
<td>junior and senior years.</td>
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<td>subsequent graduate study often take additional</td>
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<td>mathematics as part of their undergraduate preparation.</td>
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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 1111K, 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 Polytechnical 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 1 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**