

## Section 10.3 Guidance for Fourth Science Requirement

The intention of this rule is to provide students some flexibility in meeting the fourth science requirement. Courses can be selected from academic science courses or from approved career technology courses that meet science standards.

The fourth science unit may be used to meet both the science and elective requirements, as illustrated in the examples above. Courses can be used to meet both science and elective requirements but they DO NOT earn two credits. Students cannot earn two credits for one course.

**The fourth science course does not necessarily need to be taken in the student's fourth, or senior, year.**

In addition to academic, AP and IB science courses, the following chart shows courses that can be used to meet the fourth science requirement in the new graduation rule. Additional courses may be included on subsequent updates. Some courses on the list below may meet pathway requirements. Students focused on completion of a career pathway may use these courses to meet both the pathway AND the fourth science requirement.

Course Number	Course Name
26.07100	Zoology
26.03100	Botany
26.07200	Entomology
26.05100	Microbiology
26.06100	Ecology
26.07300	Human Anatomy and Physiology
40.06300	Geology
40.07100	Oceanography
40.04100	Meteorology
40.32110	Astronomy
40.09300	Forensic Science
26.01500	Genetics
40.05100	Chemistry I
40.05200	Chemistry II
40.08100	Physics I
40.08200	Physics II
26.01300	Biology II
40.06400	Earth Systems
26.06110	Environmental Science
26.01400	Advanced Placement Biology
26.06200	Advanced Placement Environmental Science
40.05300	Advanced Placement Chemistry
40.08300	Advanced Placement Physics B
40.08410	Advanced Placement Physics C: Mechanics

40.08420	Advanced Placement Physics C: Electricity and Magnetism
26.64000	Advanced Genetics/DNA Research
40.08900	Advanced Physics Principles/Robotics
40.09100	Advanced Scientific Internship
40.09200	Advanced Scientific Research
26.01800	International Baccalaureate Biology SL
26.01900	International Baccalaureate Biology HL
40.05500	International Baccalaureate Chemistry SL
40.05600	International Baccalaureate Chemistry HL
40.09500	International Baccalaureate Physics SL
40.08600	International Baccalaureate Physics HL
40.09500	International Baccalaureate Design Technology SL
40.09600	International Baccalaureate Design Technology HL
40.09400	Chemical & Material Science Engineering

Course Number	Course Name
02.42100	Animal Science Technology/Biotechnology ***
02.44100	Plant Science and Biotechnology ***
02.47500	Biotechnology
02.42400	Veterinary Science***
02.47100	Basic Agricultural Science and Technology***
21.45100	Energy and Power Technology***
21.45700	Appropriate and Alternative Energy Technologies ***
21.45200	Foundations of Electronics ***
21.45300	Advanced AC and DC Circuits ***
21.47200	Engineering Applications ***
25.52100	Introduction to Healthcare Science ***
25.52200	Application of Therapeutic Services ***
47.46600	Aviation Meteorology***
20.41810	Food Science ***
20.41710	Food & Nutrition Through the Lifespan ***
03.45100	Forest Science ***
03.41100	Natural Resources Management
03.45300	Wildlife Management***
01.46100	General Horticulture and Plant Science ***
11.01600	AP Computer Science A
11.01700	AP Computer Science AB
21.45400	Digital Electronics ***

Below are three scenarios to model how students can gain credit and meet requirements.

Student A takes the following courses in the areas of science and CTAE. Student A is taking the Engineering Career Pathway.

Science Requirement	Science Course	Requirement Met	Credit Awarded	CTAE Course	Requirement Met	Credit Awarded
1 <sup>st</sup> Requirement	Biology	X	1	Foundations of Engineering and Technology	X	1
2 <sup>nd</sup> Requirement	Physics	X	1	Engineering Concepts	X	1
3 <sup>rd</sup> Requirement	Chemistry	X	1	<i>Engineering Applications</i>	X	0
4 <sup>th</sup> Requirement	<i>Engineering Applications</i>	X	1	Research, Design, and Project Management	X	1
<b>Totals</b>		<b>4</b>	<b>4</b>		<b>4</b>	<b>3</b>

Student A has met the requirements for all four sciences and for the Engineering and Technology pathway utilizing *Engineering Applications*. This course, identified in Appendix B, met the requirements in both areas; however, only one credit was awarded to the student – in the area of science. No credit was awarded for Engineering Applications in the career pathway.

Student B takes the following courses in the areas of science and CTAE. Student B is taking the Therapeutic Nursing Essentials Career Pathway.

Science Requirement	Science Course	Requirement Met	Credit Awarded	CTAE Course	Requirement Met	Credit Awarded
1 <sup>st</sup> Requirement	Biology	X	1	Introduction to Health Science	X	1
2 <sup>nd</sup> Requirement	Physical Science	X	1	Application of Therapeutic Services	X	1
3 <sup>rd</sup> Requirement	Chemistry	X	1	Nursing Essentials	X	1
4 <sup>th</sup> Requirement	<i>Human Anatomy &amp; Physiology</i>	X	1	<i>Human Anatomy &amp; Physiology</i>	Supports Area of Interest	0
<b>Totals</b>		<b>4</b>	<b>4</b>		<b>3</b>	<b>3</b>

Student B has met the requirements for all four sciences and for the Therapeutic Nursing Essentials Career Pathway. *Human Anatomy & Physiology* relates to the career pathway selected by the student.

Student C takes the following courses in the areas of science and CTAE. Student C is taking the Agriscience Career Pathway.

Science Requirement	Science Course	Requirement Met	Credit Awarded	CTAE Course	Requirement Met	Credit Awarded
1 <sup>st</sup> Requirement	Biology	X	1	Animal Science Technology/Biotechnology	X	1
2 <sup>nd</sup> Requirement	Physics	X	1	<i>Plant Science and Biotechnology</i>	X	0
3 <sup>rd</sup> Requirement	Earth Systems	X	1	Basic Agricultural Science and Technology	X	1
4 <sup>th</sup> Requirement	<i>Plant Science and Biotechnology</i>	X	1			
<b>Totals</b>		<b>4</b>	<b>4</b>		<b>3</b>	<b>2</b>

Student C has met the requirements for all four sciences and for the Agriscience Career Pathway utilizing *Plant Science and Biotechnology*. This course, identified in Appendix B, met the requirements in both areas; however, only one credit was awarded to the student – in the area of science. No credit was awarded in the career pathway. The student will now need one additional elective in their program of study in order to meet the 23 total credits needed for graduation.

**OR**

Student C takes the following courses in the areas of science and CTAE. Student C is taking the Agriscience Career Pathway.

Science Requirement	Science Course	Requirement Met	Credit Awarded	CTAE Course	Requirement Met	Credit Awarded
1 <sup>st</sup> Requirement	Biology	X	1	Animal Science Technology/Biotechnology	X	1
2 <sup>nd</sup> Requirement	Physics	X	1	Plant Science and Biotechnology	X	1
3 <sup>rd</sup> Requirement	Environmental Science	X	1	Basic Agricultural Science and Technology	X	1
4 <sup>th</sup> Requirement	<b>Botany</b>	X	1	<b>Botany</b>	Supports Area of Interest	0
<b>Totals</b>		<b>4</b>	<b>4</b>		<b>3</b>	<b>3</b>

Student C has met the requirements for all four sciences and for the Agriscience Career Pathway. Botany relates to the career pathway selected by the student.

Student D is not in a CTAE Pathway. Student D has chosen to take two years of Modern Language.

Science Requirement	Science Course	Requirement Met	Credit Awarded	Elective Course	Requirement Met	Credit Awarded
1 <sup>st</sup> Requirement	Biology	X	1	French I	X	1
2 <sup>nd</sup> Requirement	Physics	X	1	French II	X	1
3 <sup>rd</sup> Requirement	Environmental Science	X	1	<b>Engineering Applications</b>	X	0
4 <sup>th</sup> Requirement	<b>Engineering Applications</b>	X	1			
<b>Totals</b>		<b>4</b>	<b>4</b>		<b>3</b>	<b>2</b>

Student D has met the requirements for all four sciences and for the CTAE/Fine Arts/Modern Language category. **Engineering Applications**, identified in Appendix B, met the requirements in both areas; however, only one credit was awarded to the student in the area of science. No credit was awarded in the CTAE/Fine Arts/Modern Language category. The student will now need one additional elective in their program of study in order to meet the 23 total credits needed for graduation.

Student E takes the following courses in the areas of science and CTAE. Student E is taking the Agriscience Career Pathway and plans to attend a university upon graduation.

Science Requirement	Science Course	AREAS OF STUDY (III) Science Requirement Met	(III) Science Credits Awarded/Required	Courses for AREAS OF STUDY (V) and/or (VII)	AREAS OF STUDY (V) and/or (VII) Requirement Met	AREAS OF STUDY (V) and/or (VII) Credit Awarded/Required
1 <sup>st</sup> Requirement	Biology	X	1	<i>Animal Science Technology/ Biotech.*</i>	X	0
2 <sup>nd</sup> Requirement	Physics	X	1	Plant Science and Biotechnology*	X	1
3 <sup>rd</sup> Requirement	Environmental Science	X	1	Basic Agricultural Science and Technology*	X	1
4 <sup>th</sup> Requirement	<i>Animal Science Tech./ Biotech.*</i>	X	1	French I	X	1
				French II	X	1
				Math Support I	X	1
				Music Appreciation I	X	1
				Botany		<b>1</b>
<b>Totals</b>		<b>4 of 4</b>	<b>4 of 4</b>		<b>7 of 7</b>	<b>7 of 7</b>

Student E has met the requirements for all four sciences and for the Agriscience Career Pathway utilizing *Plant Science and Biotechnology*. This course, identified in Appendix A, met the requirements in both areas; however, only one credit was awarded to the student. The student fulfilled requirements for both Areas of Study (V) and (VII) in their individual Education and Career Plan in order to meet the 23 total credits needed for graduation and university admission.

## Section 10.4 Frequently Asked Questions - Science

**1. *Does a student taking a GaDOE identified CTAE pathway science course receive two credits?***

Students may receive credit for a course only once. Students may meet the requirements of two different areas in their program of study by taking courses identified in Appendix B. Students receive a science credit for courses used to meet the multiple requirement.

**2. *Are science courses listed in a mandated sequence?***

No, science courses may be placed in a sequence by the LEAs to best meet the need of their students.

**3. *Do students have to take Physics and Chemistry to get into college?***

No, colleges and universities typically require “a” physical science. Both courses are considered physical sciences. Some universities do have a requirement for one of the two, so it is in the best interest of the student to take at least one.

**4. *Do all students have to take Physical Science since it is on the Georgia High School Graduation Test?***

No, the Georgia High School Graduation Test (GHSGT) will be altered to represent Biology and the physics portion of Physical Science. However, students not taking the Physical Science course must take the Physics course to be prepared for the GHSGT.

**5. *Will the chemistry portion of Physical Science remain on the Georgia High School Graduation Test if everyone is not required to take it?***

No, physics concepts will be identified as critical for all students.

**6. *Can students take courses from the first three requirements as their fourth year (i.e. courses not taken through the first three)?***

Yes, students wishing to focus in the area of science may take sequences such as, 1) Biology, Physical Science, Chemistry, and Physics; 2) Biology, Physics, Chemistry, and Environmental Science; or 3) Biology, Physics, Earth Systems, and Environmental Science.

**7. *Are Earth Systems and Environmental Science courses for students not strong in science?***

No, all science courses are developed and defined by the Georgia Performance Standards as rigorous, high level courses. These courses are not to be used to “track” students in science.