# Georgia STEM Certification Continuum for High School

**The high school certification requires that students be in an internship program prior to certification**

| Criteria | Continuum<br>Pre-Implementation | → | → | Full Implementation |
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| **1. STEM Vision and Culture** | No vision is in place and there is no STEM culture evident in the school. | → | | The vision for STEM is clearly defined and a STEM culture has been established within the program and/or school (students articulate through their actions a passion and perception that STEM is the culture in this school). |
| **Required:**<br>1. The STEM vision for the school/program is written.<br>2. The school provides evidence that a STEM culture has been established (it is the school's decision how they will show this). | | | | |
| **2. STEM students**<br>**(Not applicable for whole school certification)** | No students are identified as STEM. | STEM students are identified. | STEM students are identified and a selection process is described. | STEM students are identified by a school designed selection process that has been vetted with successful longitudinal evidence. |
| **Required:**<br>1. A description of how students are selected based upon specific criteria such as academic achievement, interest, standardized test scores, lottery, random selection, etc.<br>2. A four-year plan of course options for STEM students are in a written document<br>3. A copy of the STEM application for the STEM program/school. | | | | |
| **3. Non-traditional student participation in STEM (minorities, females, and economically disadvantaged)**<br>**(Not applicable for whole school certification)** | The non-traditional student participation does not reflect the diversity of the school. | A plan is being developed for outreach, support, and focus on non-traditional student populations. | A plan is in place for outreach, support, and focus on non-traditional student populations. | The non-traditional student participation reflects the diversity of the school in terms of gender, minorities, and economically disadvantaged. |

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| **Required:**<br>1. Documentation of non-traditional student participation (The term Nontraditional Careers refers to jobs that have been traditionally filled by one gender. The US Department of Labor defines Nontraditional Occupations as occupations for which individuals from one gender comprise less than 25% of the individuals employed in each such occupation. For certification purposes, the definition is expanded to include minorities and economically disadvantaged). | | | | |
| **4. Characteristics of the STEM curriculum** | Students in the STEM program follow a similar curriculum as students not in the STEM program. | A plan is being developed for an explicit and unique curriculum for STEM students or a specific curriculum for STEM students is currently implemented only an some of the school's grade levels. | There is a plan in place to expand an explicit and unique curriculum from grade level to multiple grade levels and to maintain sustainability. | STEM students are exposed to a unique and explicit curriculum that is different from non-STEM students and there is evidence of its sustainability (four plus years). The STEM curriculum should support one or more of the GaDOE STEM focus areas: advanced academics, agriculture, architecture, biotechnology, computer science, cybersecurity, energy, engineering, food science and nutrition, forensic science, and/or health care science. |
| **Required:**<br>1.Written description of the unique characteristics of the STEM curriculum.<br>2. The school's STEM focus area is described. | | | | |
| **EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS**<br>• The curriculum offers opportunities for student presentations of investigations and findings.<br>• There is evidence that students engage in regular "arguments from evidence" during classroom instruction<br>• There are opportunities for students to interact with STEM professionals to support curriculum<br>• There are opportunities that involve older students working with elementary students in the STEM program<br>• There are opportunities for students to interact with business/community/museum/university partners to support curriculum<br>• A school foundation composed of parents, community, and business partners has been established to maintain sustainability<br>• An entrepreneur component of the STEM program may be in place. | | | | |
| **5. Teacher Content Knowledge** | None of the STEM teachers are working toward increasing content | | | STEM teachers *<u>are working toward</u>* increasing content knowledge in science and math through multiple means such as:<br>• content collaboration with |

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| | knowledge in science and math. | | | business/industry or post-secondary partners or informal education partners.<br>• STEM Endorsement (available from the Ga PSC school year 2018-19)<br>• additional coursework in math and/or science at the post-secondary level<br>• content collaboration with business/industry, post-secondary partners.<br>• externships |
| **Required:**<br>1. Documentation of method/procedures implemented for increasing math and science content knowledge for all STEM teachers.<br>2. Documentation of the plan for sustaining content knowledge and induction of new STEM teachers. | | | | |
| **6. Teacher Professional Learning** | There is no STEM related professional development currently being planned or that has been offered in the last year. | STEM teachers attended at least one STEM professional learning event. | STEM teachers have on-going STEM-specific professional learning and there is evidence of its implementation in classroom instruction. | STEM teachers have on-going STEM professional learning and STEM specific strategies as it relates to the school's identified STEM focus area and there is evidence of its implementation in classroom instruction |
| **Required:**<br>1. Documentation of STEM specific professional learning for all STEM teachers that incorporates the following:<br>• Project/problem/place-based learning<br>• Integrated instruction<br>• Investigative research-based practices<br>• Collaborative planning practices | | | | |

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| • Improve STEM-focused content knowledge (advanced academics, agriculture, architecture, biotechnology, computer science, cybersecurity, energy, engineering, food science and nutrition, forensic science, health care science, and/or information technology).<br>2. Documentation of visits to other STEM Certified Schools (what school staff visited and where did they go). | | | | |
| **EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS**<br>• STEM teachers have tailored their professional learning to their specific needs and/or to their STEM focus area.<br>• STEM teachers participate in a job-embedded or practice-based approach to professional learning<br>• STEM teachers attend STEM and/or content area state, regional, and national conferences<br>• STEM teachers present at STEM and/or content area state, regional, and national conferences<br>• STEM teachers/administrators have visited other STEM Certified Schools<br>• STEM teachers observe other STEM teachers (peer observations, instructional rounds, etc)<br>• STEM teachers participate in project/problem-based learning professional learning<br>• STEM teachers participate in professional learning related to STEM integration<br>• STEM teachers participate in professional learning to strengthen STEM content knowledge and skills | | | | |
| **7. Teacher Collaboration** | There is no collaboration or collaboration is not structured or planned. | Teachers collaborate quarterly to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. | Teachers have a set time they collaborate at least monthly together to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. | Teachers collaborate at least weekly to plan integrated lessons, share/co-create STEM activities, and plan learning outcomes. The school administration must provide planning time for teachers |
| **Required:**<br>1. Documented evidence of weekly STEM collaborative planning time (minutes, generated artifacts, agendas, etc). | | | | |
| **8. STEM Pathways** | Students are not pathway completers | Some STEM students complete a pathway | ~75% of STEM students complete a pathway | 100% of STEM students complete a STEM CTAE* (agriculture, architecture, biotechnology, computer science, cyber security, energy, engineering, food science and nutrition, forensic science, health care science, and/or information technology) or *science and mathematics advanced academics pathway (AP math & science courses). |

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| **Required:**<br>1. Documentation of the number of students completing and working on a specific STEM pathway.<br>2. School must document work with your district CTAE Director. | | | | |
| **9. Math & Science Instruction** | Students do not take high level math and science coursework | <50% of the STEM students are enrolled in AP/IB/Dual Enrollment math & science courses | ~75% the STEM students are enrolled in AP/IB/Dual Enrollment math & science courses. Additional supports are instituted to assist students in meeting these expectations. | All STEM students are enrolled in AP/IB/Dual Enrollment math & science courses. The school provides additional supports to assist students in meeting these expectations. |
| **Required:**<br>1. Documentation of the number of students enrolled and passing AP/IB/Dual Enrollment math and science classes. | | | | |
| **10. Business, Community, and Post-Secondary Partnerships**<br>**STEM Georgia Business/Community/Post-Secondary Partnership Involvement Levels** | There are no business, community, and post-secondary partnerships. | Plans are being developed to provide student opportunities to meet STEM partners and to participate in STEM learning environments directly connected to in-class learning. | Business, community, and post-secondary partnerships are involved in the STEM instructional program 1-4 times/school year and are directly connected to in-class learning. | Multiple business, community, and post-secondary partnerships are on-going and are involved by directly connecting to in-class instruction, project/problem-based learning, and exposing students to STEM careers. |
| **Required:**<br>1. Documentation on the quality of the partnership engagement based upon the STEM Georgia Partnership Involvement Levels. ***There must be involvement at all three levels.*** | | | | |
| **11. STEM Competitions** | No STEM students are involved in STEM competitions, on-site/online STEM exhibits, and/or in state and national STEM forums. | Some select students participate in STEM Competitions. | A majority of the STEM students participate in STEM competitions on-site/online STEM exhibits, and/or in state and national STEM forums. | All STEM students participate in STEM competitions on-site/online STEM exhibits, and/or in state and national STEM forums. |
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<tr><td colspan="5">Required:<br>1. Documentation that shows how many students have participated in each STEM competition or exhibit (this should equal the number of students in the STEM school/program).</td></tr>
<tr><td colspan="5">EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS<br>• Included but not limited to the examples listed below:<br>Examples:<br>STEM Talk, Science Olympiad, Science and Engineering Fair, eCybermission, TAG IT Challenges, Dupont Essay Contest, BioGENEius Challenges, Clean Tech Challenges, Vex and Lego Robotics, Math Competitions, Technology Fairs, CTAE CTSO Competitions, etc.</td></tr>
<tr><td>12. Project/Problem-Based Learning</td><td>Students are only assessed using state and unit assessments.</td><td>In addition to state and unit assessments, teachers use multiple indicators of success in a STEM content area, including knowledge and performance-based assessments.</td><td>In addition to state, unit, knowledge, and performance-based assessments, short and long-term projects/problems are implemented and are moving toward student-generated ideas.</td><td>Short and long-term projects/problems are implemented throughout the school year incorporating student-generated ideas that are standards-based, multidisciplinary and real-world. <u>Students are able to articulate the relationship among the concepts they learned in math and science to their created projects.</u></td></tr>
<tr><td colspan="5">Required:<br>Summary of grade level specific, interdisciplinary, STEM-focused, problem/project-based learning opportunities that have occurred throughout the school year (curriculum map, timeline, calendar, etc).</td></tr>
<tr><td colspan="5">EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS<br>• Collaborative projects that require planning, research, discussion/debate, and presentations<br>• Products that require students to analyze and interpret data, construct explanations and design solutions, and engage in argument from evidence<br>• Experimentation that requires students illustrate their understanding of STEM concepts<br>• Peer/Self-assessment on products using rubrics<br>• Solving problems using real-world applications<br>• Student demonstrations that reflect mastery of STEM content and procedures<br>• Student work may be designed around the Grand Challenges<br>• Portfolios that allow students to portray their learning via collections of personal work<br>• A culminating project that integrates all the STEM content areas<br>• Student work created in collaboration with a business/community/post-secondary partner</td></tr>
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| **13. STEM Integration** | STEM is not integrated into the curriculum. Students receive daily math and science instruction in isolation. | STEM students receive integrated math and science instruction 1-3 times/week. | STEM students participate in integrated math and science instruction. Instruction is occasionally integrated into other content areas. Standards may be revisited from previous years. | Students receive daily math and science instruction that supports a STEM project correlated to current math and science standards. Instruction is multidisciplinary, including mathematics, technology and the science and engineering practices:<br>1. Asking questions (for science) and defining problems (for engineering)<br>2. Developing and using models<br>3. Planning and carrying out investigations<br>4. Analyzing and interpreting data<br>5. Using mathematics and computational thinking<br>6. Constructing explanations (for science) and designing solutions (for engineering)<br>7. Engaging in argument from evidence<br>8. Obtaining, evaluating, and communicating information<br>Students are able to clearly articulate an understanding of the math and science concepts being studied. |
| **Required:**<br>1. Documentation of the school or classroom schedule indicating time spent on interdisciplinary learning. | | | | |
| **14. STEM Labs/Resources** | There are no STEM lab/resources in the school. | The STEM lab has only technology access and a few resources. | The STEM lab(s) has technology access and resources, but are only used by a few teachers. | The STEM lab(s) has technology access and resources are used by multiple teachers for collaboration, project work, virtual collaboration, and can be used as exhibition space. |

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| **Required:**<br>1. Documentation describing the STEM lab(s), including who uses the lab, how often, and for what purposes? | | | | |
| **15. Student Rigor & Relevance and Instructional Quality** | Most of the learning occurs at the acquisition level. Content knowledge is taught in a silo by discipline and instruction focuses on knowledge awareness and comprehension of information. Classroom instruction is predominantly teacher centered. | Most of the learning occurs at the acquisition and application levels. Classroom instruction is predominantly teacher centered. Work shows students designing solutions to problems centered on a single discipline at a time by applying knowledge to new situations. | Most of the learning occurs at the assimilation levels. Classroom instruction is predominantly student centered and students extend and refine their acquired knowledge to routinely analyze and solve problems, as well as create unique solutions. | Learning occurs at the adaptation level on a regular basis. ***Classroom instruction is predominantly student centered*** and students have the competence to think in complex ways and also apply the knowledge and skills they have acquired. When confronted with perplexing unknowns, students are able to create solutions and take action that further develops their skills and knowledge. |
| **Required:**<br>1. Submission of at least two examples of student work that has occurred at the adaptation level of the Rigor and Relevance Framework (See appendix on the STEM Certification Application for the Framework). | | | | |
| **EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS**<br>• Students are asked to use extensive knowledge and skills to take action on perplexing problems with unknown solutions<br>• Student work is designed around a STEM community or business/industry problem<br>• Project products are exhibited that indicate quadrant D critical thinking skills are being used<br>• Involvement with a specialized science, math, and/or engineering program(s)<br>A culture of inquiry, creativity, and innovation exists among students, teachers, and administrators. | | | | |
| **16. Student Internships and/ or Capstone Project** | No students are involved in internships or are required to complete a capstone project. | 1-49% of STEM students complete an internship or capstone project. | 50-75% of STEM students complete an internship or capstone project. | 100% of STEM students complete an internship and/or capstone project. |
| **Required:**<br>1. Submission of at least two examples of student work as a result of an internship and two examples of a capstone project. | | | | |
| **EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS** | | | | |

- Students are asked to use extensive knowledge and skills to take action on perplexing problems with unknown solutions
- Student work is designed around a STEM community or business/industry problem
- Students work with university/business partners on real world projects/research
- Project products are exhibited that indicate quadrant D critical thinking skills are being used
- Involvement with a specialized science, math, and/or engineering program(s)
- A culture of inquiry, creativity, and innovation exists among students, teachers, and administrators.

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| **17. Technology Integration** | There is little or no technology integration supporting STEM teaching and learning. | A technology plan is in place to integrate a variety of technology tools supporting STEM teaching and learning. | A technology plan is implemented in STEM classrooms. Classrooms include a variety of technology tools that are integrated at least weekly into STEM teaching and learning. | Technology use is ubiquitous throughout STEM classrooms and students are producers and not just consumers of digital content. Technology is used to collect and analyze data. |

**Required:**

1. Submission of at least two student-produced products through the use of technology.
2. Evidence of ubiquitous use of technology throughout classrooms.

**EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS**

- Students are regular producers of websites, blogs, computer programs, videos, classroom digital products, etc.
- Computer-based, online, mobile, virtual, and other technology tools are integrated into STEM classwork
- Probes are used to collect and analyze data
- Tablets are in use with apps specific to the topic
- Graphing calculators may be used to solve problems at the upper elementary level
- STEM industry related technology is available for student use
- 21st century technology tool products by students are visible throughout the school.
- Instructional technology equipment is rarely inoperable

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| • Teachers and students receive on-going access and opportunity to expand their proficiency in technology use | | | | |
| **18. Investigative Research** | There is no investigative research occurring in classes. | Students are conducting investigative research that is grade-level appropriate but the purpose is ill-defined and variables have not been identified. | STEM students are conducting investigative research that is grade level appropriate, variables have been identified, and the scientific process is understood. | STEM students conduct investigative research to make claims, collect evidence, analyze data, and argue from evidence. Students are able to communicate results via written, oral, and digital presentations and enter their research in a science, math and/or engineering competition. Students have evidence of ongoing research and data collection documented in their STEM journals or digital portfolios. |
| **Required:**<br>1. Submission of at least two student investigative research topics and their findings.<br>2. Documentation of the number of students participating in a science and/or engineering fair and their results.<br>3. Students have documentation of investigative research in their STEAM journals or digital portfolios. | | | | |
| **EXAMPLE ARTIFACTS THAT SUPPORT STEM EFFORTS**<br>• Students enter a science and engineering fair<br>• Students present findings to a public audience<br>• Students publish research in a public venue<br>• Student research is posted in hallways and classroom walls | | | | |
| **19. Accountability** | There is no evidence the STEM program is increasing student academic growth.. | → | → | Schools determine the evidence that STEM students are increasing in academic growth. |
| **Required:**<br>1. Schools indicate evidence the STEM program is increasing student academic growth over a three year period through a standardized measure selected by the school. | | | | |

***Georgia Department of Education CTAE STEM Pathways: agriculture, architecture, biotechnology, computer science, cyber security, energy, engineering, food science and nutrition, forensic science, and health care science.**