COMPETENCY ASSESSMENT CROSSWALK

Master of Arts in Teaching/Science
Aligned with NSTA 2012, and CAEP Standards

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<th>Competencies NSTA Standards aligned with TEAL Reports</th>
<th>Required Classes (Syllabi Linked to Class Number)</th>
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| TEAL Goal 1: M.A.T. Science education candidates will be able to demonstrate content knowledge at admission to the internship/student teaching. | Undergraduate Science Courses  
Core Pre-requisite: Lab-based courses in Biology I & II, Chemistry I & II and Physics I & II.  
+  
30 hours or upper level coursework in a specific field of the natural science.  
One graduate level content course in Biology, Chemistry, Physics and Marine Science. | Praxis II Exam Scores | 100% of M.A.T. Science education candidates will meet or exceed the state of South Carolina mandated score of 570 on the Praxis II Biology and General Science Examination or 540 on the Praxis II Chemistry, Physics and General Science Examination prior to entering the teaching internship/student teaching. | Since all of the M.A.T. science candidates met the required the Praxis II scores it can be inferred the pre-program preparation of the candidates is sufficient. However, starting in Fall 2014 the candidates will be required to complete one of three specialized Praxis II Examinations for Biology, Chemistry or Physics. This change in testing could potentially reveal some content-specific weaknesses in the preparation of the M.A.T. science candidates. |
specific technology.  
1c) Show an understanding of state and national curriculum standards and their impact on the content knowledge necessary for teaching P-12 students.

**NSTA Standard 1**

CAEP: 1.1-1.5, 3.5, 3.6, 4.2

**TEAL Goal 2:**  
M.A.T. Science education candidates will be able to demonstrate content knowledge at admission to the program

**NSTA Standard 2: Content Pedagogy**

Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students.

Preservice teachers will:

2a) Plan multiple lessons using a variety of inquiry approaches that demonstrate their knowledge and understanding of how all students learn science.

2b) Include active inquiry lessons where students collect and interpret data in order to develop and communicate concepts and understand scientific processes, relationships and

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<th>Transcript Analysis</th>
<th>Unit Planning Assignment</th>
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<td>100% of M.A.T. Science education candidates will (1) complete an undergraduate degree in a science discipline or complete the equivalent credit hours in a science discipline, (2) earn an overall undergraduate GPA of 2.5 or higher (3) earn a 2.75 GPA or higher for courses in the science discipline and (4) successfully complete the following lab-based courses: Biology I, Biology II, Chemistry I, Chemistry II, Physics I and Physics II prior to entering the M.A.T. Science education program.</td>
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The instructional planning assessment is administered during the fall semester as part of the science methods course (EDSC 553 Principles of Teaching Science). At this point in the M.A.T. program the science candidates have limited experience preparing lessons, having completed only one semester of education courses, as well limited or no experience teaching high school students. Subsequently, the science candidates’ scores should be interpreted within the context of their limited practical experiences.  

In the upcoming spring semester, the science candidates will participate in a teaching internship which will provide them with authentic high school teaching experiences. After completing the internship they should be able to accurately gauge the effectiveness of their lessons and observe the value of inquiry-based instruction on student learning. Despite the present limitations the instructional planning assessment
natural patterns from empirical experiences. Applications of science-specific technology are included in the lessons when appropriate.

2c) Design instruction and assessment strategies that confront and address naïve concepts / preconceptions.

_NSTA Standard: 2_
_CAEP: 1.1-1.5, 43.5, 5.1_

does provide some important information about the teaching skills and behaviors. These teaching skills and behaviors need to be closely monitored during the spring teaching internship.

First, the ability of the science candidates to plan and implement developmentally appropriate lessons in the classroom setting should be reexamined. It is possible, if not likely, after working with actual students the science candidates will improve their ability to prepare and teach lessons that are developmentally appropriately for high school learners.

Second, the science candidates need to become more familiar with the science standards. In the public school system all instruction must be aligned with and highlight the science concepts identified in the state standards. After working with their cooperating teachers during the spring internship the science candidates’ knowledge of the standards should improve.

Third, the science candidates will have multiple opportunities to prepare formative and summative assessments. This science candidates will receive additional practice and can a better understanding of how to design assessments.

Fourth, the science candidates will
have multiple opportunities to teach inquiry lessons and to compare the effectiveness of inquiry lesson to more teacher-centered approaches such as lectures and demonstrations. Through these hands-on experiences, the science candidates will be able to observe that inquiry and other student-centered instructional approaches improve student learning.

In conclusion, most of the science candidates are performing adequately at this point in the program. However, there is room for improvement in at least four areas, discussed above, and these will be closely monitored during the spring teaching internship.

| TEAL Goal 3: M.A.T. Science education candidates will be able to demonstrate content knowledge at admission to the program. |
| NSTA Standard 1: Content Knowledge |
| Effective teachers of science understand and articulate the knowledge and practices of contemporary science. They interrelate and interpret important concepts, ideas, and applications in their fields of licensure. |

| Undergraduate Science Courses |
| Core Pre-requisite: Lab-based courses in Biology I & II, Chemistry I & II and Physics I & II. |
+ 30 hours or upper level coursework in a specific field of the natural science. |

| Transcript and GPA Analysis |
| All Preservice teachers will: |
3a) Use a variety of strategies that demonstrate the candidates’ knowledge and understanding of how to select the appropriate teaching and learning activities – including laboratory or field settings and applicable instruments and/or technology – to allow access so that all students learn. These strategies are inclusive and motivating for all students. |
3b) Develop lesson plans that include active inquiry lessons where students collect and interpret data using applicable science-specific technology in order to develop concepts, understand scientific processes, relationships and natural science. |

No M.A.T. science candidate was admitted to the program without meeting the core requirements and all other deficiencies were addressed through coursework in the program. The lack of earth science content among the M.A.T. science candidates was addressed by enrolling the candidates in MSCI 510 Earth Systems Science which addresses diverse topics within the field of earth science. The course was offered during Summer I 2014 and 12 candidates (including the 6 candidates that were deficient in this area) successfully completed the course with a grade of a “C” or higher. |

All of the 11 M.A.T. science candidates completed an authentic...
Preservice teachers will:
1a) Understand the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommended by the National Science Teachers Association.
1b) Understand the central concepts of the supporting disciplines and the supporting role of science-specific technology.
1c) Show an understanding of state and national curriculum standards and their impact on the content knowledge necessary for teaching P-12 students.

NSTA Standard 1
CAEP:1.1-1.5, 3.5,3.6,4.2

patterns from empirical experiences. These plans provide for equitable achievement of science literacy for all students.
3c) Plan fair and equitable assessment strategies to analyze student learning and to evaluate if the learning goals are met. Assessment strategies are designed to continuously evaluate preconceptions and ideas that students hold and the understandings that students have formulated.
3d) Plan a learning environment and learning experiences for all students that demonstrate chemical safety, safety procedures, and the ethical treatment of living organisms within their licensure area.

science inquiry project in a graduate physics course, PHYS Topics in Contemporary Physics for Physics Teachers. The inquiry project was assessed by the course instructor.

In conclusion, the M.A.T. science candidates admitted to the program met the minimum course requirements and any identified deficiencies were addressed through additional graduate level content courses. At this time the key assessment appears to effectively address the NSTA Science Teacher Preparation Standards and does not need to be modified.
TEAL Goal 4: M.A.T. Science education candidates will successfully complete the internship/student teaching experience.

NSTA Standard 2: Content Pedagogy
Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students. Preservice teachers will:

2a) Plan multiple lessons using a variety of inquiry approaches that demonstrate their knowledge and understanding of how all students learn science.
2b) Include active inquiry lessons where students collect and interpret data in order to develop and communicate concepts and understand scientific processes, relationships and natural patterns from empirical experiences. Applications of science-specific technology are included in the lessons when appropriate.
2c) Design instruction and assessment strategies that confront and address naïve concepts/preconceptions.

EDSC 590 Internship

Internship Summative Evaluation Form

100% of M.A.T. Science education candidates will achieve a score of “3” or higher for each of the categories identified on the M.A.T. Science Internship Summative Evaluation Form.

The science candidates ostensibly meet the minimum requirements stated on the new version of the Teaching Observation Instrument. However, there are issues related to the instrument that need to be addressed. Based on feedback from the cooperating teachers the following modifications will be implemented:

Both NSTA 2a and NSTA 2b are divided into two separate scoring categories in order to differentiate between the candidates’ knowledge and understanding of the standard/indicators and their ability to teach the standard/indicators. The majority of cooperating teachers found the two categories redundant and requested only one category encompassing the candidates’ understanding and ability to implement inquiry instruction. For the 2015 version of the Teaching Observation Instrument each standard/indicator will be addressed using only one scoring category.

All of the instrument items need to be reworded so that it is clear the cooperating teacher and university supervisor will independently evaluate the science candidate’s teaching overall performance as Unacceptable, Developing, Proficient or Exemplary. (During the internship this was how it was agreed the science candidates should be scored). The science candidate then submits the
**NSTA Standard: 2**
**CAEP:1.1,1.5,43.5,5.1**

**NSTA Standard 4: Safety**

Effective teachers of science can, in a P-12 classroom setting, demonstrate and maintain chemical safety, safety procedures, and the ethical treatment of living organisms needed in the P-12 science classroom appropriate to their area of licensure.

Preservice teachers will:

4a) Design activities in a P-12 classroom that demonstrate the safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used within their subject area science instruction.

4b) Design and demonstrate activities in a P-12 classroom that demonstrate an ability to implement emergency procedures and the maintenance of safety equipment, policies and procedures that comply with established state and/or national guidelines. Candidates ensure safe science activities appropriate for the abilities of all students.

4c) Design and demonstrate an appropriate number of lessons plans for the rating or he/she can receive a lower rating for lack of evidence.

Finally, the science candidates will be required to video record 4 lessons as supporting evidence for their ability to address the required NSTA Standards/Indicators. This will provide additional empirical evidence supporting a candidate’s ratings on the Internship Teaching Observation Instrument.

Analysis of the Teacher Work Sample (TWS) reveals the M.A.T. science candidates are generally proficient at addressing NSTA Standards/Indicators NSTA 1c, NSTA 2c, NSTA 3a, NSTA 3c and NSTA 5a. Additionally, these results indicate the candidates’ performances and understandings of specific NSTA standards/indicators have improved since the fall 2013 science methods course.
activities in a P-12 classroom that demonstrate ethical decision-making with respect to the treatment of all living organisms in and out of the classroom. They emphasize safe, humane, and ethical treatment of animals and comply with the legal restrictions on the collection, keeping, and use of living organisms.

**NSTA Standard: 4
CAEP: 2.2, 2.3,2,3.5,3.6,4.1**

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<th>TEAL Goal 5: M.A.T. Science education candidates will be</th>
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Specifically, the candidates have made observable improvements on the following NSTA standards/indicators since the fall semester:

- NSTA 1c- understanding of state and national standards
- NSTA 2c- ability to design instruction and assessment strategies that address students’ naive concepts/preconceptions
- NSTA 3a- the ability to develop and use a variety or appropriate instructional approaches

As stated in the Instructional Planning report (Goal #3) the candidates were generally meeting these standards/indicators but there was clearly room for improvement. The data from the TWS indicate that working in the public schools with their cooperating teachers positively impacted the science candidates’ understandings of the standards/indicators discussed above. Based on this data no major changes to the M.A.T. science education program are necessary.
**NSTA Standard 5: Impact on Student Learning**

Effective teachers of science provide evidence to show that P-12 students’ understanding of major science concepts, principles, theories, and laws have changed as a result of instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach.

Preservice teachers will:

5a) Collect, organize, analyze, and reflect on diagnostic, formative and summative evidence of a change in mental functioning demonstrating that scientific knowledge is gained and/or corrected.

5b) Provide data to show that P-12 students are able to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science.

5c) Engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.

<p>| EDSC 580 | EDSC 580 Teacher Work Sample | M.A.T. Science education candidates will receive a score of 80% or higher for the Teacher Work Sample prior to completing the teaching internship. |
| NSTA Standard: 5 | CAEP: 4.1-4.4,5.2 |</p>
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<th>TEAL Goal 6: M.A.T. Science education candidates will be able to provide students with a safe and ethical science learning experience.</th>
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| **Standard 6: Professional Knowledge and Skills**  
Effective teachers of science strive continuously to improve their knowledge and understanding of the ever changing knowledge base of both content, and science pedagogy, including approaches for addressing inequities and inclusion for all students in science. They identify with and conduct themselves as part of the science education community. Preservice teachers will:  
6a) Engage in professional development opportunities in their content field such as talks, symposiums, research opportunities, or projects within their community.  
6b) Engage in professional development opportunities such as conferences, research opportunities, or projects. |
| **EDSC 590 Internship**  
**Internship Summative Evaluation Form**  
**Documentation of Professional Development**  
**Praxis II**  
**Research Project related to teaching science** |
| 100% of M.A.T. Science education candidates will earn at least 80% on the Bio Ethical and Safe Science Teaching (BEASST) assessment. |
| • Not Available |
within their community.

**NSTA Standard 6**
CAEP: 1.2-1.5,2.2,3.1.42.5.2

**TEAL Goal 7:**
M.A.T. Science education candidates will be able to understand and conduct authentic scientific inquiries.

**NSTA Standard 2:**
Content Pedagogy
Effective teachers of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students.
Below are the elements of the standard.
Preservice teachers will:
2a) Plan multiple lessons using a variety of inquiry approaches that demonstrate their knowledge and understanding of how all students learn science.
2b) Include active inquiry lessons where students collect and interpret data.

| EDSC 553 | Knowledge and Skills of Teaching Assessment (KAST) | M.A.T. Science education candidates will earn at least 80% for the Knowledge and Skills of Teaching (KAST) assessment. |
in order to develop and communicate concepts and understand scientific processes, relationships and natural patterns from empirical experiences. Applications of science-specific technology are included in the lessons when appropriate.

2c) Design instruction and assessment strategies that confront and address naïve concepts/preconceptions.

**NSTA Standard 2**

**CAEP:** 1.3,1.4,2.2,4.2,5.2,5.3

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<th>TEAL Goal 8: M.A.T. Science education candidates will be able to prepare and teach lessons integrating the nature of science, the applications of science, and the impact of science on local communities. <strong>NSTA Standard 5: Impact on Student Learning</strong> Effective teachers of science provide evidence to show that P-12 students’ understanding of major science concepts, principles, theories, and laws have changed as a result of</th>
<th><strong>EDSC 553</strong> <strong>EDSC 590</strong></th>
<th><strong>Nature of Science Assessment (NOSA)</strong></th>
<th><strong>M.A.T. Science education candidates will earn at least 80% of the available points for the Nature of Science Assessment (NOSA).</strong></th>
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instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach. Below are the elements of the standard. Preservice teachers will:
5a) Collect, organize, analyze, and reflect on diagnostic, formative and summative evidence of a change in mental functioning demonstrating that scientific knowledge is gained and/or corrected.
5b) Provide data to show that P-12 students are able to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science.
5c) Engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.

**NSTA Standard 5**

**CAEP: 1.1-1.5, 2.1, 2.2, 4.2**

| TEAL Goal 9: M.A.T. Science education candidates will demonstrate | Throughout the Program of Study | Dispositions Rubric | M.A.T. Science education candidates will model professional behaviors |
### NSTA Standard 3: Learning Environments

Effective teachers of science are able to plan for engaging all students in science learning by setting appropriate goals that are consistent with knowledge of how students learn science and are aligned with state and national standards. The plans reflect the nature and social context of science, inquiry, and appropriate safety considerations. Candidates design and select learning activities, instructional settings, and resources—including science-specific technology, to achieve those goals; and they plan fair and equitable assessment strategies to evaluate if the learning goals are met.

Below are the elements of the standard.

Preservice teachers will:

3a) Use a variety of strategies that demonstrate the candidates’ knowledge and understanding of how to select the appropriate teaching and learning activities—including laboratory or field settings and applicable instruments and/or technology—to allow access so that all students learn. These strategies are inclusive and motivating for
all students.

3b) Develop lesson plans that include active inquiry lessons where students collect and interpret data using applicable science-specific technology in order to develop concepts, understand scientific processes, relationships and natural patterns from empirical experiences. These plans provide for equitable achievement of science literacy for all students.

3c) Plan fair and equitable assessment strategies to analyze student learning and to evaluate if the learning goals are met. Assessment strategies are designed to continuously evaluate preconceptions and ideas that students hold and the understandings that students have formulated.

3d) Plan a learning environment and learning experiences for all students that demonstrate chemical safety, safety procedures, and the ethical treatment of living organisms within their licensure area.

NSTA Standard 3
CAEP: 1.1-1.5, 3.3,4.2,4.3,5.2