

Initial Approval of Specialty Program

Recommendations from Review Panel Regarding Programs to Prepare Teachers of Integrated Science: Elementary (DI)

January 11, 2006

Institution: Central Michigan University					
Program Level	Major (# Credits)	Minor (# Credits)	Group Major (# Credits)	Group Minor (# Credits)	Endorsement Only (# Credits)
Elementary			38-39	33-34	
Secondary					
K-12					
Source of Standards/Guidelines: Michigan State Board of Education				Pub. Date: Aug. 8, 2002	
Program Assessment Summary/Recommendation					
Meets all standards and requirements	X	Not all standards and requirements are met	X	Insufficient documentation for program review	
Approval	X	Program is not Approvable as Presented			
Standards/Requirements Not Met:					
<p>Standard 1.2.2 – <i>living and non-living</i>, is not met. BIO 101 <i>General Biology</i> is the only course cited for this standard, but BIO 101 is 1 of 2 possible course selections for the elementary major or minor. Please confirm how the institution meets this standard for all elementary majors or minors if BIO 101 is not taken.</p> <ul style="list-style-type: none"> ✓ This was a typographical error. The second paragraph dealt with BIO 105. It has been corrected in the document as shown below. ✓ BIO 101 introduced during the lecture on life forms. Present historical criteria for classification including discussion of the current thoughts on extraterrestrial life and also in a comparison with viruses, nanobes, and prions. BIO 105 introduces living vs. nonliving during the discussion of the characteristics of life and also in a comparison with viruses and prions. <p>Standard 1.8.1.9 - <i>qualitative analysis</i> is not met. Evidence supporting this standard lacks detail. Evidence is needed beyond, “<i>CHM 127 has an experiment on unknown analysis.</i>” Provide concepts, activities and descriptions within the narrative that support this standard.</p> <ul style="list-style-type: none"> ✓ In the CHM 127 lab an experiment is done that has the students identify the compound present in each of 6 unknown solutions by observing chemical reactions of the solutions and comparing results with results observed using known solutions. In 					

another experiment students generate hydrogen and oxygen gas and identify these gases based on their properties. A third experiment has students observing chemical reactions and characterizing the reactions as to the type of reaction.

Standard 6.0 - *safe science classroom* is not met. Please include direct references to the safe standards as identified by the Council of State Science Supervisors. The elementary and secondary safety guide, checklist, and recommendations can be accessed at <http://www.csss-science.org/safety.shtml>.

- ✓ After discussion with those who give the workshop and with the methods faculty, this section has been expanded to include the following detail.
- ✓ All students must attend a workshop on the care and use of animals in the classroom and the safe storage, use and disposal of chemicals. Prior to the workshop, students are expected to have read *Science and Safety: It's Elementary* from the Council of State Science Supervisors' web site. Following the workshop, students must pass a quiz to receive a certificate of achievement. This must be included with the student teaching application. All classes discuss protective safety equipment.

BIO 101 and BIO 105 have labs using mice and gerbils. The proper handling and care of these organisms are introduced then as well as the stressors introduced in classrooms. General safety precautions, glassware and chemical safety, dealing with accidents, and safety rules are discussed in nearly every lab. When live organisms are used, their care is discussed, demonstrated and monitored.

BIO 351 (major only) animal care and use in the classroom is emphasized, especially as it relates to experimentation and classroom pets. The entire document from the Council of State Science Supervisors' web site is covered in this class with special emphasis on classroom design and management for safety as well as using plants and animals in the classroom. Planning for safe field trips is an essential part of the methods class.

CHM 127 has an entire lab on safe practices, policies, and finding safety related information on the computer. This lab covers all accidents – chemical, fire, body fluids, and cuts as well as managing chemicals for use in the elementary classroom. How to purchase and store chemicals is also discussed and practiced in this class

Additional information needed/action to be taken:

Please clarify the number of semester hours needed for an elementary integrated science group minor. Form XX states 30-31, but when reviewers added the required courses on Form XX, the total appeared to be 33-34.

- ✓ The courses on the attached form XX for the minor total 30-31.
- ✓ BIO 229 is not required on the minor. We wanted to allow the students some flexibility to take other courses. BIO 229 is required of all students on the elementary education curriculum. So all students whether Integrated Science minors or not will have taken BIO 229. By not requiring it on the minor, all students will have taken the course, but some may choose to take another 200-level course for the minor.

Form XX includes BIO 229 (*Nature Study*) as a required course for an elementary minor. The course list at the end of the Program Summary does not include BIO 229. If BIO 229 is not required in the program, then the semester hour total and standards covered by BIO 229 are in jeopardy. Please clarify.

- ✓ There is no reason for the standards covered by BIO 229 to be in jeopardy because BIO 229 is required of all students on the elementary education curriculum. So all students whether Integrated Science minors or not will have taken BIO 229. By not requiring it on the minor, all students will have taken the course, but some may choose to take another 200-level course for the minor.

Please clarify Kevin Stedman's qualifications. He is listed as teaching PHS 351 (*Physical Science for the Elementary Grades*) and PHS 452 (*Physical Science for the Middle Grades*) with a "M.S. from CMU in Counseling and a B.S. in Ed. from CMU in Mathematics and Physics.

- ✓ Kevin Stedman received his BS in Ed from CMU with a major in mathematics and minor in physics. He holds a Michigan Professional Certificate. He currently teaches AP Physics, Algebra II, and Geometry and coaches Science Olympiad at St. Louis High School. He previously taught mathematics and physical science and coached Quiz Bowl and Science Olympiad at Lakeview High School. He is very well-qualified to teach methods at CMU. His resume is attached.

Please specify and clarify how teacher candidates **are prepared** to utilize a variety of instructional approaches to address the various learning styles of students in the program summary portion of the application. The program summary includes one method of preparing students. "*Students experience a variety of instructional approaches throughout their career at CMU.*" Also, the program summary states that courses "*require students to apply their knowledge of different learning styles as they design lesson plans to accommodate various learning styles.*" This does not explain how candidates gain their knowledge of different learning styles and instructional approaches.

- ✓ The information in the summary statement has been expanded to include the instruction students receive in learning styles and instructional approaches as shown below. What students gain throughout their professional development courses is refined and applied to the science as described below.
- ✓ Students gain their knowledge of different learning styles primarily in their professional education pedagogy courses. This knowledge is reinforced and applied in the pedagogy courses required for the major. BIO 351 (Biological Science for Elementary Teachers), PHS 351 (Physical Science for the Elementary Grades), PHS 452 (Physical Science for the Middle Grades), and ESC 400 (Earth Science Education), require students to apply their knowledge of different learning styles as they design lesson plans to accommodate various learning styles. Students are required to approach a lesson from at least two different student learning styles (auditory and visual, for example) and to provide both instruction and assessment for various learning styles. The instruction on different learning styles and multiple intelligences is presented in the science methods classes as students are prepared to complete the lesson plan assignments. Students complete several assessments that identify both their teaching and learning styles. Thus students become acquainted with the strengths and weaknesses of their own styles and how that impacts their teaching.

In addition, students experience a variety of instructional approaches throughout their career at CMU. Some of the science courses are taught as large lecture classes with over 100 students in the lecture. Many of these classes have now incorporated an active learning component involving group work and cooperative learning. However, many of the classes are small allowing for lively discussion and in-class laboratory.

The laboratory classes vary from straight “cookbook” labs where the students merely follow the directions, collect data and draw conclusions, to labs where the students identify the variables and design the experiment. All students will be required to design experiments at some point whether they are an Integrated Science Major or Minor. Most of the introductory courses make an effort to introduce students to various methods of note taking and to a variety of study techniques. Students then apply these techniques to their lesson plan instruction and assessment as they apply.

Standard A (*Michigan Curriculum Framework*) and C (*prepares candidates to understand and teach biology, chemistry, physics, and earth/space science as integrated content*) do not have any courses and course numbers cited for the elementary minor. Provide course names and numbers in addition to the narrative that meet these standards.

- ✓ The matrix for Standard A has been revised as follows:

The elementary education methods courses taken as part of the degree program meet this requirement (EDU 345, EDU 361, EDU 452, EDU 485). A methods course in the content area is not required of the minor in an effort to include more science. However, students who elect to take BIO 101T are exposed to the benchmarks as required knowledge.

- ✓ The matrix for Standard C has been revised as follows:

The elementary education methods courses taken as part of the degree program meet this requirement (EDU 325, EDU 361, EDU 452, EDU 485). A methods course in the content area is not required of the minor.

Comments:

Reviewers compliment:

- The large percentage (76%) of faculty reporting involvement in P-12 collaborative work.
- ✓ Our Dean in the College of Science and Technology strongly encourages and supports K-12 collaboration. We are very fortunate.

Reviewers suggest:

- Consider adding hot links within the matrix to facilitate movement from course to syllabi.
- ✓ When the disk was submitted to CMU Teacher Certification office, they were hot linked.
- Specifying the optional or elective courses cited throughout the matrix. For example, Standard 4.0 - *locate appropriate resources, design and conduct inquiry-based open-ended scientific investigations, interpret findings, communicate results, and make judgments based on evidence* – cites BIO 351, but does not state it is one of four possible course selections available to teacher candidates.
- ✓ Thank you for this suggestion. We are designing an integrated science methods class. When it passes the curricular process, students will not have choices with regard to the methods classes.

Standard 1.7.4 – *astronomy*. PHS 101 *Survey of Physical Science* is cited as meeting this standard for an elementary major. PHS 101 is not a required course for an elementary major according to Form XX, Application Attachment 3. Should the institution simply shift the PHS 101 from the elementary major to the elementary minor column?

- ✓ Yes, PHS 101 is only required on the minor. It was incorrectly placed on the matrix. This error has been fixed in the revised document.

The institution is encouraged to begin collecting outcome data related to the Integrated Science: Elementary standards because outcome data will be the basis of subsequent periodic reviews.

- ✓ Thank you. We are meeting to set our assessment goals in mid-March. We feel this will be a challenge that will take a lot of planning. We will integrate assessment of this program with our Program Review for the department and also with the CMU required assessment of the major.