

Initial Approval of Specialty Program

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

January 24, 2006

Institution: Central Michigan University				
Program Level	Comprehensive Group Major (# Credits)	Group Major (# Credits)	Group Minor (# Credits)	Endorsement Only (# Credits)
Elementary				
Secondary	53	36-45		
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	Approval Pending		Approval Suspended
<p>Standards/Requirements Not Met:</p> <p>Reviewers are concerned with the following statement in the program summary. <i>“Although all students must take the required core of courses and are encouraged to gain a broad base of knowledge in all sciences, there is some latitude in this program of study for the substitution of equivalent or more advance coursework based upon the student’s background. The Learner Centered focus is continued in several courses as students make choices in the assignments they complete and the way in which they fulfill course requirements.”</i> How does the institution ensure all standards will be met if teacher candidates substitute courses or alter course expectations that may or may not meet standards cited by original course? For example, course A may be required and cited several times throughout the matrix. If a teacher candidate substitutes course B for course A, how will the standards citing course A be met.</p> <ul style="list-style-type: none"> ✓ We appreciate the concern of the reviewers and understand how substitution of requirements could be problematic. First, we expect it to be a rare case when a student would choose to substitute a higher level course than the one that is required. Examples include a student who would take the math-based Meteorology course (ESC 240) rather than the general, qualitative Weather course (ESC 201). Unfortunately, students in the education programs become so accustomed to “following the rules to the letter” that they often take courses at a far lower level than their abilities just because they are on the list. We want to encourage our secondary education students to be as academically aggressive as possible. We are willing to remove that statement, but feel that our students, and their K-12 students, would benefit from the option. All advisors know the standards and would make sure they are being met. <p><i>Standard 1.7.3 atmosphere, weather, climate</i> is not met for teacher candidates pursuing a group major</p>				

with an embedded earth science minor. The only course cited for this standard is ESC 201 *Weather*. ESC 201 is one of two possible course selections for an integrated science group major/earth science minor candidate. Please confirm how the institution meets this standard for integrated science group major/earth science minor candidates if ESC 201 is not taken.

- ✓ We have included the syllabus for ESC 240, Meteorology, and have spoken with the faculty who teach the course. The topics in ESC 240 meet the standard. The only reason that it is not the course of first choice is because it will be too difficult for most students due to the mathematical content. We spoke with the faculty who taught each of the additional courses that would be taken on a minor and verified that the standards were being met in all cases.

Standard 1.7.4 astronomy is not met for teacher candidates pursuing a group major with an embedded earth science minor. The only course cited for this standard is AST 111 *Astronomy*. AST 111, along with AST 112, is one of two possible course selections for an integrated science group major/earth science minor candidate. Please confirm how the institution meets this standard for integrated science group major/earth science minor candidates if AST 111 is not taken.

- ✓ Similar to the above situation in Earth Science, AST 260 and AST 261 are the two semester astronomy sequence for majors. Both semesters have a substantial lab and there is a significant mathematics prerequisite. Students who take AST 260 and AST 261 will receive a superior background to those who take AST 111 and AST 112. We have included the syllabi for AST 260 and AST 261 and have included them in the matrix.

Several standards citing **only** CHM 131 *Introduction to Chemistry I* and/or CHM 132 *Introduction to Chemistry II* are not met for teacher candidates pursuing a group major with an embedded chemistry minor. CHM 131 and CHM 132, together, are one of two possible selections for an integrated science group major/chemistry minor. For example, standard 1.8.1.2 *stoichiometry* cites CHM 131 and CHM 132, but an integrated science group major/chemistry minor could choose CHM 161 *Principles of Chemistry* according to the Program Summary, section G, integrated science major summary instead of CHM 131 and CHM 132. Please confirm how the institution meets these eight or so standards citing **only** CHM 131 and/or CHM 132 for integrated science group major/chemistry minor candidates if CHM 131 and/or CHM 132 are not taken.

- ✓ The syllabus for CHM 161 is included with this revised submission and the course is listed in the matrix. CHM 161 is the honors one-semester course for highly prepared and motivated students. Only students who are going to be chemistry minors will take this course. You will notice that CHM 161 covers all of the matrix topics in depth except electrochemistry and qualitative analysis. Topics in organic chemistry are touched on but are not emphasized because these students will take two full semesters of organic with a lab. All chemistry minors also take Quantitative Analysis (CHM 211), Organic Chemistry I (CHM 345), Organic Chemistry II (CHM 346), Introduction to Organic Chemistry Laboratory (CHM 349), Teaching Chemistry/Physics in the Secondary School (CHM 505), and three hours of electives. All matrix topics are covered in depth in this array of courses.

Standards 1.8.3 Physics (1.8.3.1-1.8.3.5) are not met. Courses cited in these standards PHY 130 *College Physics I*, PHY 131 *College Physics II*, PHY 170 *college Physics Laboratory II*, and PHY 171 *College Physics Laboratory II* are not required for teacher candidates pursuing a group major with an embedded physics minor according to the Program Summary, section G, integrated science major summary. Please confirm how the institution meets these standards for integrated science group major/physics minor candidates.

- ✓ The physics courses listed on the Integrated Science Major (PHY 130, 131, 170 and 171) require math prerequisites of Plane Trigonometry (MTH 106) and College Algebra (MTH 107). The physics courses required of the Physics Minor (PHY 145, 146, 175, and 176)

require calculus as a prerequisite. The topics covered in the courses are fairly parallel, but the approach is much more intense. All standards are covered by this sequence of courses and reinforced by the other courses on the Physic Minor.

Standard 6.0 - safe science classroom is not met. Reviewers could find little evidence of the understanding and promotion of safe science classrooms in any syllabi except SCI 400 *Integrated Science in Secondary School*, and, then, no reference was made to Council of State Science Supervisors. Please include direct references to the safe standards as identified by the Council of State Science Supervisors in matrix and syllabi for cited courses. The secondary safety guide, checklist, and recommendations can be accessed at <http://www.csss-science.org/safety.shtml>.

- ✓ We reviewed the instruction students receive in safety and improved it in two ways. We beefed up the coverage of safety in SCI 400, as shown in the syllabus. In addition to the safety instruction received in laboratory classes, our students are required to attend a safety workshop based on the Council of State Science Supervisors materials and those of NIH and OSHA. We developed a separate workshop for the secondary and the elementary students since their needs are very different. This will provide more appropriate instruction on chemical storage and handling, as well as the care and use of animals.

Additional information needed/action to be taken:

Please include faculty information for BIO 105 *Introductory Quantitative Biology* on the instructional faculty form.

Please include faculty information for additional required courses for group majors with an embedded minor on the instructional faculty form.

- ✓ We included the BIO 105 faculty as well as all faculty who teach courses specific to the Earth Science, Chemistry and Physics minors.

Please resubmit Form XX including courses required in the different alignments available for group majors with embedded minors.

- ✓ We have included all options in Form XX.

Provide syllabi for new courses provided in Form XX and when cited in standards/guideline matrix.

- ✓ We have included all master syllabi.

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.

- ✓ We discussed this as a council and have improved the explanation of where our preservice teachers learn to differentiate both instruction and assessment.

Comments:

Several times throughout matrix the institution cites "all courses." For example, standard 1.8.2.6 *heterocyclic compounds* states "heterocyclic compound discussed in all biology classes." Reviewers suggest identifying specific course names and numbers in future reviews rather than "all courses."

- ✓ We will do that on the next submission.

In future reviews, please add the specialty area for all faculty members listed on the instructional faculty form.

- ✓ We have done that on this form.

Reviewers compliment:

- The high percentage of science faculty involved in P-12 Collaborative work (over 75%).
- The comprehensive philosophy, rationale, and objectives included in the program summary.
- The 36-45 plus semester hours required for a secondary integrated science group major with required linkage to one of four single science discipline minors programs which exceed minimum state semester hour requirements.

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