**REQUEST TO COLLEGE CURRICULUM COMMITTEE FOR CURRICULAR IMPROVEMENTS**

**DEPARTMENT:** GEOS  **PROPOSED EFFECTIVE SEMESTER:** Fall 2014  **COLLEGE:** Arts & Sciences

**PROPOSED IMPROVEMENTS**

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**Other:**

**Title of degree, curriculum, major, minor, concentration, or certificate:** Secondary Integrated Science Education

**Existing course prefix and #:**  **Proposed course prefix and #:**  **Credit hours:**

**Existing course title:**

**Proposed course title:**

**Existing course prerequisite & co-requisite(s):**

**Proposed course prerequisite(s):**

If there are multiple prerequisites, connect with "and" or "or". To remove prerequisites, enter "none."

**Proposed course co-requisite(s):**

If there are multiple corequisites, they are always joined by "and."

**Proposed course prerequisite(s) that can also be taken concurrently:**

Is there a minimum grade for the prerequisites or corequisites?

The default grades are D for undergraduates and C for graduates.

**Major/minor or classification restrictions:**

List the Banner 4 character codes and whether they should be included or excluded.

**For 5000 level prerequisites & corequisites:** Do these apply to: (circle one) undergraduates graduates both

**Specifications for University Schedule of Classes:**

a. Course title (maximum of 30 spaces):

b. Multi-topic course: ☐ No ☑ Yes

c. Repeatable for credit: ☐ No ☑ Yes

d. Mandatory credit/no credit: ☐ No ☑ Yes

e. Type of class and contact hours per week (check type and indicate hours as appropriate)

1. ☑ Lecture
2. ☑ Lab or discussion
3. ☑ Lecture/lab/discussion
4. ☑ Seminar or ☑ studio
5. ☑ Independent study
6. ☑ Supervision or practicum

**CIP Code (Registrar’s use only):**

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Chair/Director  Date

Chair, College Curriculum Committee  Date

Dean  Date:  Graduate Dean:  Date

Curriculum Manager: Return to dean ☐ Date  Forward to:  Date

Chair, COGE/ PEB / FS President  Date

**FOR PROPOSALS REQUIRING GSC/USC REVIEW:**

* ☑ Approve ☐ Disapprove  Chair, GSC/USC  Date

* ☑ Approve ☐ Disapprove  Provost  Date

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Revised May 2007. All previous forms are obsolete and should not be used.

CAS14-55
1. Explain briefly and clearly the proposed improvement.

We plan to create a new major in Secondary Integrated Science Education. In cooperation with the College of Education and Human Development, this program of study will lead to teacher certification under the Michigan DI endorsement (Integrated Science – Secondary), and thus prepare students to teach science in grades 6-12. This program will only be available as a 2nd major to students in biology, chemistry, earth science, or physics teaching majors.

2. Rationale. Give your reason(s) for the proposed improvement. (If your proposal includes prerequisites, justify those, too.)

Statewide and nationally, there is a shortage of qualified middle and high school science teachers. The Integrated Science endorsement is in high demand in Michigan schools, particularly at the middle school level, where science is typically taught as integrated content. Principals prefer to hire teachers with this endorsement, as they are considered capable of teaching in multiple science subject areas. To ensure that our teacher candidates have both the breadth of science knowledge that this program provides and expertise in at least one science subject area, this program will only be open to students already pursing an education degree in a science subject (biology, chemistry, earth science, or physics). Currently, we lose secondary teaching students to Grand Valley and Central Michigan University, both of which offer this program of study. Adding this program will make us more competitive in attracting and retaining students.

3. Effect on other colleges, departments or programs. If consultation with others is required, attach evidence of consultation and support. If objections have been raised, document the resolution. Demonstrate that the program you propose is not a duplication of an existing one.

WMU does not currently have a program of study leading to this endorsement at the secondary (grades 6-12) level. The College of Education is developing an Elementary Integrated Science major leading to teacher certification in grades K-8. There is some overlap in coursework between that program and the one proposed here.

Required coursework in this program will be drawn from the departments of Geosciences, Biological Sciences, Chemistry, Geography, and Physics. All of these departments have agreed to the coursework in the program and provide letters of support for the program. We expect the program to have a slight increase in enrollment in the courses involved.

4. Effect on your department’s programs. Show how the proposed change fits with other departmental offerings.

Our program already offers a major in Earth Science Secondary Education, leading to Michigan DH (Earth/Space Science) endorsement at the grade 6-12 level. Our program is proposing to eliminate the minor in Earth Science Secondary Education. There is considerable overlap between coursework in these two programs. Students already in the Earth Science Education major will be eligible to add Integrated Science as a 2nd major.

There is no overlap between this program and the other non-teaching majors offered by Geosciences.

5. Effects on enrolled students: Are program conflicts avoided? Will your proposal make it easier or harder for students to meet graduation requirements? Can students complete the program in a reasonable time? Show that you have considered scheduling needs and demands on students’ time. If a required course will be offered during summer only, provide a rationale.

Because this program will be a 2nd major, we intend to waive any course requirements that also appear in the student’s 1st major. For example, if the student is a Biology Secondary Education major, overlapping required biology (and chemistry, physics, and math cognate) courses would be waived from the Integrated Science program. This should both avoid program conflicts and reduce the amount of time for program completion. Teaching majors normally take students 4-5 years to complete (with CAS and COEHD requirements), and we anticipate that this program can be completed in the same amount of time.

All of the courses in the program are offered during the regular academic year. Courses offered only in particular semesters will be noted on the program form, and considered in academic advising. An academic advisor in the Geosciences Department will assist students with program planning.

6. Student or external market demand. What is your anticipated student audience? What evidence of student or market demand or need exists? What is the estimated enrollment? What other factors make your proposal beneficial to students?
We anticipate that the program will eventually enroll 30-40 students. Because the DI endorsement is in such high demand in Michigan, we anticipate that this program will enhance students’ competitiveness on the teaching job market.

7. Effects on resources. Explain how your proposal would affect department and University resources, including faculty, equipment, space, technology, and library holdings. Tell how you will staff additions to the program. If more advising will be needed, how will you provide for it? How often will course(s) be offered? What will be the initial one-time costs and the ongoing base-funding costs for the proposed program? (Attach additional pages, as necessary.)

The program will cause a slight increase in the number of students enrolled in the individual courses. One new course will be developed in Earth Science Teaching and Learning and offered as an elective in this program (see separate proposal for revision of the Earth Science Teaching major). No additional space, technology, equipment, or library holdings will be required for this program.

The main need for this program is advising. The Geosciences Department will house this program and assign one of the current undergraduate advisors (Hampton, Kominz, or Petcovic) to advising for this program. Dr. Petcovic currently advises for the Earth Science Education major; closing the Earth Science Education minor will free some of her service time toward this program.

8. General education criteria. For a general education course, indicate how this course will meet the criteria for the area or proficiency. (See the General Education Policy for descriptions of each area and proficiency and the criteria. Attach additional pages as necessary. Attach a syllabus if (a) proposing a new course, (b) requesting certification for baccalaureate-level writing, or (c) requesting reapproval of an existing course.)

N/A

9. List the learning outcomes for the proposed course or the revised or proposed major, minor, or concentration. These are the outcomes that the department will use for future assessments of the course or program.

Students who complete this program will:
- Demonstrate that they possess sufficient content knowledge and the ability to teach a secondary integrated science curriculum as guided by the Michigan Curriculum Framework K-12 Science Content Standards and Benchmarks
- Develop an understanding of the interconnectedness of all science, along with major unifying themes, and relate these understandings to the teaching of science
- Be prepared to understand and teach biology, chemistry, physics, and earth/space science as integrated content
- Pass the Michigan Test for Teacher Certification in Secondary Integrated Science

10. Describe how this curriculum change is a response to assessment outcomes that are part of a departmental or college assessment plan or informal assessment activities.

COEHD faculty and administrators determined the need for this program through their review process.

11. (Undergraduate proposals only) Describe, in detail, how this curriculum change affects transfer articulation for Michigan community colleges. For course changes, include detail on necessary changes to transfer articulation from Michigan community college courses. For new majors or minors, describe transfer guidelines to be developed with Michigan community colleges. For revisions to majors or minors, describe necessary revisions to Michigan community college guidelines. Department chairs should seek assistance from college advising directors or from the admissions office in completing this section.

This program is a four-year degree and thus does not duplicate any major offered at a community college. We will work with COEHD and CAS advising staff to develop transfer guides for this new program. All current articulation agreements for individual courses in this program will be upheld. A maximum of 20 credit hours of transfer coursework will be accepted into this program.
Catalog Copy for Proposed Program:

Secondary Integrated Science Education: Major (65-66 hours)

The Secondary Integrated Science Education major is designed for students preparing to teach science as integrated content in middle and high schools (grades 6-12). This program is only available as a second major, and requires a first major in biology, chemistry, earth science, or physics secondary education. Any courses applied to the first major will be waived from this program.

No grade below a "C" will be accepted in the required courses.

Required Courses

Required Biology (14 hrs):
- BIOS 1600 - Biological Form and Function Credits: 3 hours
- BIOS 1610 - Molecular and Cellular Biology Credits: 4 hours
- BIOS 1620 - Ecology and Evolution Credits: 4 hours
- BIOS 2500 - Genetics Credits: 3 hours

Required Chemistry (12 hrs)
- CHEM 1100 - General Chemistry I Credits: 3 hours
- CHEM 1110 - General Chemistry Laboratory I Credits: 1 hour
- CHEM 1120 - General Chemistry II Credits: 3 hours
- CHEM 1130 - General Chemistry Laboratory II Credits: 1 hour
- CHEM 3700 - Introduction to Organic Chemistry Credits: 3 hours
- CHEM 3710 - Introduction to Organic Chemistry Lab Credits: 1 hour

Required Earth/Space Science (23 hrs)
- GEOG 2250 - Introduction to Meteorology and Climatology Credits: 4 hours
- GEOS 1000 – Dynamic Earth Credits: 4 hours OR GEOG 1050 – Physical Geography 4 hours
- PHYS 1030 - Sky and Solar System Laboratory Credits: 1 hour
- PHYS 1040 - Introduction to the Sky and Solar System Credits: 3 hours
- GEOS 1310 – Historical Geology Credits: 4 hours OR GEOS 2000 - Evolution of Life - A Geological Perspective Credits: 4 hours
- GEOS 2320 – Integrated Earth System Studies Credits: 3 hours
- GEOS 3010 – Minerals and Rocks Credits: 4 hours

Required Physics (10 hrs)
- PHYS 1130 - General Physics I Credits: 4 hours
- PHYS 1140 - General Physics I Laboratory Credits: 1 hour
- PHYS 1150 – General Physics II Credits: 4 hours
- PHYS 1160 - General Physics II Laboratory Credits: 1 hour

Required Pedagogy (6-7 hrs)
- SCI 3030 - Teaching about Science Inquiry and the Nature of Science Credits: 3 hours OR GEOS 4500 – Teaching & Learning Earth Science Credits: 4 hours OR PHYS 4220 - Teaching and Learning in Physics Credits: 4 hours
- SCI 4040 - Teaching of Secondary Science Credits: 3 hours

Mathematics Cognate Requirement (4 hrs)
- MATH 1180 – Pre-calculus Math Credits: 4 hours OR Higher level mathematics coursework OR STATS 3640 if pre-requisite mathematics requirements are met.

Baccalaureate-Level Writing Requirement
Students who have chosen the Secondary Integrated Science Education major will satisfy the Baccalaureate-Level Writing Requirement by successfully completing one of the following courses:
- ES 3950 - School and Society Credits: 3 hours
Statements of Support:

From: kirk.korista@wmich.edu [mailto:kirk.korista@wmich.edu]
Sent: Friday, October 04, 2013 10:53 AM
To: Heather Petcovic; Marcia Fetters
Subject: Re: revised catalog copy for majors

Dear Marcia and Heather,

The Department of Physics supports the formation of the Secondary Integrated Science Education major.

The Department of Physics supports the addition of PHYS 1050 (Stars & Galaxies Laboratory) requirement to the Secondary Education Earth Sciences major curriculum.

Sincerely,

Kirk

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Kirk T. Korista
Professor and Chair
Department of Physics
Western Michigan University
Kalamazoo, MI 49008-5252
ph. (269) 387-4936

From: Benjamin Ofori-Amoah [mailto:ben.ofori@wmich.edu]
Sent: Thursday, October 03, 2013 2:42 PM
To: Heather Petcovic
Subject: Re: revised catalog copy for majors

Dear Heather,

The Geography Department supports the Integrated Science Program. If there is anything that I can do to support this please let me know.

Ben

Benjamin Ofori-Amoah, PhD
Professor of Geography & Chair
Western Michigan University
Department of Geography
3244 Wood Hall
Kalamazoo, MI 49008-5424
Tel: (269) 387-3424 / (269) 387-3415
Fax: (269) 387-3442
Hi Heather,

Biological Sciences supports the use of courses for the Integrated Science Major. You should use the "new curriculum - 14 hours".

Let me know if you have other questions.

John

John Spitsbergen, PhD
Professor and Chair
Department of Biological Sciences
Western Michigan University
Kalamazoo, MI 49008-5410
269-387-5648