

MEMORANDUM TO: Ogden College of Science and Engineering Curriculum Committee

Dr. Jack Rudolph	Dr. James Gary	Dr. Keith Sylvester
Dr. Martin Stone	Dr. Zhonghang Xia	Dr. John Khouryieh
Dr. Bruce Schulte	Dr. Julie Ellis	Dr. Peter Hamburger
Dr. Scott Grubbs	Dr. Warren Campbell	Dr. Keith Andrew
Dr. Cathleen Webb	Dr. David Keeling	Dr. Attila Por
Dr. Hemali Rathnayake	Dr. Fred Siewers	Dr. Alex Barzilov
Dr. David Erbach		

FROM: Andrew Ernest, Chair

SUBJECT: Agenda for Thursday, February 2, 2012 3:45 p.m. in COHH 4123

A. OLD BUSINESS:

- I. Consideration of the minutes of the December 1, 2011, meeting.

B. NEW BUSINESS:

Action Items

Department of Biology

1. Proposal to Create a New Course
 - a. BIOL 303, Life Science for Middle Grades Teachers, 1-3 hours

Department of Chemistry

1. Proposal to Revise Course Credit Hours
 - a. CHEM 470, Chemistry/Middle School, 2-4 hours

Department of Geography and Geology

1. Proposal to Create a New Course
 - a. GEOL 305, Earth System Science for Teachers, 3 hours
 - b. GEOG 439, Atmospheric Modeling, 3 hours
2. Proposal to Revise a Program
 - a. Ref. #676, Geology Earth and Space Science Concentration, 32 hours

Office of the Dean

1. Proposal to Revise a Program
 - a. Ref. #734, Middle School Science Education (“MSSE”), 48 hours

C. OTHER BUSINESS

MEMBERS PRESENT:

Dr. Martin Stone	Dr. Zhonghan Xia
Dr. Bruce Schulte via proxy	Dr. Warren Campbell
Dr. Scott Grubbs	Dr. David Keeling
Dr. David Erbach	Dr. Fred Siewers
Dr. David Erbach	Dr. John Houryieh
Dr. James Gary	Dr. Attila Por

Larry Byrd for Cathleen Webb, Mark Robinson for Peter Hamburger, Lou Strolger for Keith Andrew

FROM: Andrew Ernest, Chair

OLD BUSINESS:

Keeling/Grubbs moved approval of the minutes of the November 3, 2011 meeting. Motion passed with additions.

NEW BUSINESS:

Consent Items

The consent agenda was accepted as presented.

Action Items

Department of Architectural and Manufacturing Sciences

Keeling/Erbach moved approval of the proposal to revise a program, Ref. #518, Architectural Science. Motion passed.

Department of Biology

Keeling/Erbach moved approval of the proposal to make multiple revisions to a course, BIOL 369, Cooperative Education in Biology I. Motion passed.

Keeling/Erbach moved approval of the proposal to revise a program, Ref. #525, Major in Biology (without a minor). Motion passed with suggested changes.

Keeling/Erbach moved approval of the proposal to revise a program, Ref. #617, Major in Biology (with a minor). Motion passed with suggested changes.

OTHER BUSINESS

There was no other business. Meeting was adjourned on a Keeling motion with second by Siewers.

**Ogden College of Science and Engineering
Department of Biology
Proposal to Create a New Course
(Action Item)**

Contact Person: Dr. Bruce A. Schulte, bruce.schulte@wku.edu 745-4856

1. Identification of proposed course:

- 1.1 Course prefix (subject area) and number: BIOL 303
- 1.2 Course title: Life Science for Middle Grades Teachers
- 1.3 Abbreviated course title: Life Science for Middle Grades
- 1.4 Credit hours and contact hours: 1-3
- 1.5 Type of course: A
- 1.6 Prerequisites: BIOL 120/121, BIOL 122/123, and 6 hours of SMED 200 level and above courses.
- 1.7 Course catalog listing: This course provides pedagogical content and knowledge in life sciences with practicum experience for middle school teachers based on the Kentucky Core Contents items. Not available for credit toward any Biology, Chemistry or Biochemistry major or minor, nor does this course fulfill a general education requirement. Course is repeatable once for a maximum of 4 credit hours.

2. Rationale:

- 2.1 Reason for developing the proposed course: The current program for middle school teachers does not address the content and pedagogy for teaching the science content in middle schools. This course will specifically cover the life science content and how to teach the core content items to middle school students. The course is listed at the 300 level because it requires both the introductory biology material and pedagogy from education courses. This course will review, in the greater depth needed by middle grade teacher, selected content from BIOL 120/121 and BIOL 122/123 while also covering additional topics mandated by state and national content standards.
- 2.2 Projected enrollment in the proposed course: 20-30
- 2.3 Relationship of the proposed course to courses now offered by the department: This course will only be for middle school science majors and will not relate to other courses in the department.
- 2.4 Relationship of the proposed course to courses offered in other departments: This course will become a part of the SKyTEACH curriculum for middle school teachers.
- 2.5 Relationship of the proposed course to courses offered in other institutions: We surveyed 19 benchmark institutions: seven lack a comparable program, seven have a biology or general science course that is similar, four have more education based programs and one is developing a program. Six institutions have other upper level biology classes that can be applicable for middle school science teachers. The University of Arizona has a very similar course for teaching secondary teachers.

3. Discussion of proposed course:

3.1 Course objectives: The student will be able to:

- Use the scientific process to examine biological phenomena.
- Implement critical thinking skills to address the acquisition and understanding of biological information.
- Introduction to and practice with a range of activities, projects, demonstrations and assessments teachers need to plan and teach challenging lessons using the 5E model (Engage, Explore, Explain, Extend and Evaluate).
- Practice appropriate safety and care of waste materials for laboratory exercises.
- Describe the relationship between cells, tissues and organs in order to explain function in a multicellular organism.
- Describe the role of genes/chromosomes in the passing of information from one generation to another (heredity).
- Compare inherited and learned traits.
- Explain the relationship between structure and function of the cell components using a variety of representations.
- Describe and compare sexual and asexual reproduction.
- Make inferences about the factors influencing behavior based on data/evidence of various organisms' behaviors.
- Justify conclusions as to whether a response is innate or learned using data/evidence on behavioral responses to internal stimuli.
- Explain patterns found within groups of organisms in order to make biological classifications of those organisms.
- Describe that biological change over time accounts for the diversity of species developed through gradual processes over many generations.
- Draw conclusions about past life forms, environmental conditions and extinction of species based on the fossil record.
- Represent the flow of energy in ecosystems using data to draw conclusions about the role of organisms in an ecosystem.
- Compare abiotic and biotic factors in an ecosystem and explain consequences of change in one or more factors.
- Predict effects of changing components of an ecosystem while describing the interrelationships within an ecosystem.

3.2 Content outline:

- Coverage of Explore, College Readiness and literacy and other standards middle grade teachers are expected to teach
- Organization of living things, namely cell, tissue, organ and system structure and function
- DNA and RNA processes
- Genetics, mitosis and meiosis
- Reproduction
- Classification and survey of Kingdoms

- Describe that biological change over time accounts for the diversity of species developed through gradual processes over many generations.
- Major extinction events and the fossil record.
- Food Webs and Energy Flow
- Compare abiotic and biotic factors in an ecosystem and explain consequences of change in one or more factors.
- Predict effects of changing components of an ecosystem while describing the interrelationships within an ecosystem.

3.3 Student expectations and requirements:

- Satisfactory grades on exams and quizzes
- Completion of inquiry-based activities
- Execute and collect data on a research-based experiment
- Prepare course lesson plans for teaching middle school students
- Examine and critique different mechanisms of evaluation for middle school students

3.4 Tentative texts and course materials: A typical middle school science textbook, the text/lab books from the BIOL 120-123 series, and other course materials supplied in the form of handouts and web page links.

4. Resources:

- 4.1 Library resources: Sufficient
- 4.2 Computer resources: Sufficient

5. Budget implications:

- 5.1 Proposed method of staffing: Initially with current faculty with expectation that a new faculty line will be required as program expands.
- 5.2 Special equipment needed: None
- 5.3 Expendable materials needed: Typical introductory biology materials
- 5.4 Laboratory materials needed: Typical introductory biology lab materials

6. Proposed term for implementation: Fall 2012

7. Dates of prior committee approvals:

Department of Biology: _____ 1/27/12 _____

OCSE Undergraduate Curriculum Committee: _____

Professional Education Council: _____

Undergraduate Curriculum Committee: _____

University Senate: _____

Attachment: Bibliography, Library Resources Form, Course Inventory Form

Proposal Date:1/17/2012

**Ogden College of Science and Engineering
Department of Chemistry
Proposal to Revise Course Credit Hours
(Action Item)**

Contact Person: Kevin Williams, Kevin.williams@wku.edu, 5-8899

1. Identification of course:

- 1.1 Current course prefix (subject area) and number: CHEM 470
- 1.2 Course title: Chemistry/Middle School
- 1.3 Credit hours: 4

2. Proposed course credit hours: 2-4

3. Rationale for the revision of course credit hours: This is a special topics course that is being converted to a variable hour format. This change is necessary for compatibility and flexibility with the SKyTeach curriculum.

4. Proposed term for implementation: Fall 2012

5. Dates of prior committee approvals:

Chemistry Department	<u>January 20, 2012</u>
Ogden Curriculum Committee	_____
Professional Education Council	_____
Undergraduate Curriculum Committee	_____
University Senate	_____

Attachment: Course Inventory Form

Proposal Date: 9/21/11

**Ogden College of Science and Engineering
Department of Geography and Geology
Proposal to Create a New Course
(Action Item)**

Contact Person: Margaret Crowder (margaret.crowder@wku.edu), 745-5973

1. Identification of course:

1.1 Course prefix and number: GEOL 305

1.2 Course title: Earth System Science for Teachers

1.3 Abbreviated title: Earth Sys Sci for Teachers

1.4 Credit hours and contact hours: 3.0

1.5 Type of course: Lecture/Lab (C)

1.6 Prerequisites: GEOL 111, GEOL 112, GEOL 113, and GEOL 114

1.7 Catalog course listing: Collaborative, problem-based learning (PBL) experience, using real-world examples to enhance student understanding of earth system science, with a focus on relevance in science teaching grades K-12. Includes PBL-based lesson plan development. Applicable towards a major in geology only for those students obtaining teacher certification.

2. Rationale

2.1 Reason for developing the proposed course: Earth science is a major component of the Kentucky core content items for K-12. This course is intended to become part of the Middle School Science Education (MSSE) major core, and provide an important senior-level synthesis of student knowledge within the Earth Science education curriculum. The course will also serve the needs of secondary education majors obtaining Earth and Space Science certification. Students will become familiar with the Kentucky core content items for Earth Science, while using a systems approach in inquiry-based student learning.

2.2 Projected enrollment in the proposed course: 15-20 students. Estimate is based on historic enrollment in Middle School Science Education, present enrollment in Geology major #676, Earth and Space Science track, and enrollment of Geol 497, Earth Science for Teachers, which was run as a one-time course offering in Spring 2005.

2.3 Relationship of proposed course to courses now offered by the department: This course will build on the content of GEOL 111, 112, 113, and 114 and will serve as a synthesis course for future K-12 Earth Science educators. Course is similar in design to

GEOL 511, but is developed at the undergraduate level for pre-service teachers and will have greater focus on Kentucky core content.

2.4 Relationship of the proposed course to courses offered in other departments:

PHYS 410 Physics for Teachers is “a broad study, including laboratory experiences, of the areas of physics relevant to science teaching in grades K-12.” This course is designed to be similar in its intent, but with an earth science emphasis.

SMED 470 Project-Based instruction involves “methods, techniques, and technologies used to implement and assess problem-based investigations in math and science classrooms.” GEOL 305 will have its primary focus in earth systems relationships.

2.5 Relationship of proposed course to courses offered in other institutions:

A brief review of other institutions reveals similar courses offered through Florida State University - Geology for Pre-Service and In-Service Teachers, Penn State - Earth Systems Science for Teachers, California State University, Long Beach - Earth Science for Teachers, University of Minnesota - Advanced Earth Science for Teachers, Western Michigan University - Earth Science for Teachers, Florida International University - Earth Sciences for Teachers.

The proposed course would explore earth system science with a focus on Kentucky earth science core content.

3. Discussion of proposed course:

3.1 Course objectives: Students will:

- evolve their knowledge about Earth system science and their skills in thinking systemically about specific events.
- learn to develop strong arguments with hypotheses, assertions, and evidence.
- develop collaborative skills for knowledge-building, argument-building, and acting as a critical friend.
- develop PBL experiences designed to take into the K-12 classroom to engage students in using Earth system science thinking.

3.2 Content outline: Topics to be covered include earth systems approaches using real-world events, such as global climate change, El Niño, the 65-million-year-old Yucatán impact, eruptions of Mt. Pinatubo, changes in coral reefs, and tropical forests.

3.3 Student expectations and requirements: Participation in online discussions, completion of laboratory assignments, assessment of individual private theories and PBL lesson design, and team knowledge-building and ESS model-building written exercises.

3.4 Tentative texts and course materials:

Online materials provided through Earth System Science Education Alliance (ESSEA). Western Kentucky University is an ESSEA participating member and receives access to all ESSEA produced materials. Online content available from <http://essea.strategies.org>

4. Resources:

4.1 Library resources: See attached Library Resources form and bibliography.

4.2 Computer resources: No new additional resources required.

5. Budget implications:

5.1 Proposed method of staffing: Existing faculty will teach this course.

5.2 Special equipment needed: None.

5.3 Expendable materials needed: None.

5.4 Laboratory supplies needed: None.

6. Proposed term for implementation: Fall 2012

7. Dates of prior committee approvals:

Department of Geography and Geology __12/16/2011__

Ogden College of Science and Engineering _____

Professional Education Council _____

University Curriculum Committee _____

University Senate _____

**Ogden College of Science and Engineering
Department of Geography and Geology
Proposal to Create a New Course
(Action Item)**

Contact Person: Xingang Fan (Xingang.fan@wku.edu), 745-5980

1. Identification of proposed course:

- 1.1 **Course prefix (subject area) and number:** GEOG 439
- 1.2 **Course title:** Atmospheric Modeling
- 1.3 **Abbreviated course title:** Atmospheric Modeling
- 1.4 **Credit hours:** 3.0
- 1.5 **Schedule type:** Lecture
- 1.6 **Prerequisites:** CS 245 (Fortran), GEOG 424 (Weather Analysis/Forecasting)
- 1.7 **Catalog course listing (description):** An introduction to numerical weather and climate modeling techniques and models, with focus on modeling fundamentals, including dynamics, physical parameterizations, grids and resolutions, model structures and components. Includes hands-on experience with designing numerical experiments, configuring and running model simulations, post-processing model outputs, and visualization.

2. Rationale:

- 2.1 **Reason for developing the proposed course:** This course was offered once in Spring 2011 as a temporary course. Atmospheric modeling has been a powerful tool and played a dominant role in modern weather and climate predictions. Most of the operational weather and climate predictions, and advanced atmospheric science studies, including ocean and other climate system components, rely heavily on the utilization of numerical modeling. By offering this course, students will learn the basics of numerical modeling and become familiar with the numerical modeling processes and their products.
- 2.2 **Projected enrollment in the proposed course:** 15-20 students. Estimate is based on the number of meteorology majors and a two-year rotation plan. It is also possible that some Geography (Land-Weather-Climate concentration) majors who are interested in learning atmospheric modeling will enroll.
- 2.3 **Relationship of the proposed course to courses offered in the department:** This is a new course and the major target students are meteorology majors. Thus, basic meteorology knowledge will be needed, which is provided by the existing foundational coursework.
- 2.4 **Relationship of the proposed course to courses offered in other academic units:** No other courses covering this material are offered at WKU. However, it

will need the basic computing programming skills that are offered by CS 245 Fortran.

2.5 Relationship of the proposed course to courses offered in other institutions:

A brief review of other institutions indicates that this course is offered in many meteorology programs, including *University of Washington* – ATM 380 Weather and Climate Prediction, *Colorado State University* – ATS 604 Atmospheric Modeling, *University of California Los Angeles* – 180 Numerical methods in Atmospheric Science, 212B,C – Numerical modeling of atmosphere I,II, *University of Illinois* – ATMS 421 Earth system modeling, *Valparaiso University* – MET 430/530 Numerical weather prediction, *North Carolina State University* – MEA 400 Earth systems simulation modeling, *Ohio State University* – AS 629 Climate system modeling: Basics and applications.

3. Description of proposed course

3.1 Course Objectives: students will:

- a. Learn the basic concepts of atmospheric modeling, including basic equation set, differentiate methods, physical parameterizations, grids and resolutions, initial and boundary conditions, and model integration.
- b. Develop skills in configuring and carrying out model experiments, analyzing model outputs, and visualization, within a UNIX/Linux computing environment.
- c. Employ their knowledge in understanding, interpreting, and utilizing operational numerical prediction products.
- d. Develop basics skills in conducting atmospheric research by using models.

3.2 Course content outline:

- a. Introduction of atmospheric modeling, basic UNIX/Linux operating system, and basic Fortran programming
- b. Model basics: Equations, differentiate schemes, grids and resolutions
- c. Model structure and components
- d. A state-of-the-art weather model: Weather Research and Forecasting (WRF) model
- e. Input: Initial and boundary conditions
- f. Running model simulations
- g. Output: post-processing, analysis, and visualization

3.3 Student expectations and requirements: Participation in class lectures and discussions, completion of laboratory assignments, class research project and writing, assessment on the basic concepts of numerical modeling.

3.4 Tentative texts and course materials:

Required text:

- a. Numerical Weather and Climate Prediction, by Thomas T. Warner, Cambridge University Press, 2011.

Recommended Readings:

- a. A Climate Modelling Primer, 3rd Edition, by K. McGuffie, Wiley, 2005
- b. Atmospheric modeling, data assimilation, and predictability, by Eugenia Kalnay, New York : Cambridge University Press, c2003.
- c. Fundamentals of Atmospheric Modeling, 2nd Edition, by Mark Z. Jacobson, Cambridge, 2005
- d. Mesoscale Meteorological Modeling, 2nd Edition, by Roger. A. Pielke Sr., Academic Press, 2002

4. Resources:

4.1 Library resources:

4.2 Computer resources: The Linux cluster (32-CPU) in our Climate Research Lab is the main computing facility. Students may use Meteorology Lab computers, Climate Research Lab computers, or their own computers to access (remote logon) the cluster and carry out the course work. The newly built WKU supercomputing facility also is a potential resource.

5. Budget implications:

5.1 Proposed method of staffing: Existing faculty will teach this course, with TA support when enrollment is more than 10.

5.2 Special equipment needed: None.

5.3 Expendable materials needed: None.

5.4 Laboratory supplies needed: None.

6. Proposed term for implementation: Fall 2012

7. Dates of review/approvals:

Department of Geography and Geology _12/16/2011__

Ogden College of Science and Engineering _____

University Curriculum Committee _____

University Senate _____

Proposal Date: November 28, 2011

**Ogden College of Science and Engineering
Department of Geography and Geology
Proposal to Revise a Program
(Action Item)**

Contact Person: David Keeling (david.keeling@wku.edu), 5-4555

1. Identification of program:

- 1.1 Current program reference number: 676
- 1.2 Current program title: Geology Earth and Space Science Concentration
- 1.3 Credit hours: 32

2. Identification of the proposed program changes:

Delete CS 145, which is no longer offered by the Computer Science program.

3. Detailed program description:

Current Program	Proposed Program
Earth and Space Science	Earth and Space Science
Program Requirements 26 hours [111, 112, 113, 114, 308, 311, 325, 380, 460, 499]	Program Requirements 26 hours [111, 112, 113, 114, 308, 311, 325, 380, 460, 499]
Program Electives <u>6 hours</u> [Any 6 hours of approved Geology electives]	Program Electives <u>6 hours</u> [Any 6 hours of approved Geology electives]
Program Total 32 hours	Program Total 32 hours
<i>Additional Requirements:</i>	<i>Additional Requirements:</i>
MATH 116, PHYS 201, CS 145 , GEOG 121, ASTR 104, ASTR 106, ASTR 405, and a minor field	MATH 116, PHYS 201, GEOG 121, ASTR 104, ASTR 106, ASTR 405, and a minor field

4. Rationale for the proposed program change:

CS 145 does not meet the needs of the ESS program and is no longer offered by the Computer Science program

5. Proposed term for implementation and special provisions (if applicable):

Fall 2012

6. Dates of prior committee approvals:

Department: Geography and Geology _____ 12/16/2011 _____

Ogden College Curriculum Committee _____

Professional Education Council (if applicable) _____

Undergraduate Curriculum Committee

University Senate

Attachment: Program Inventory Form

**Ogden College of Science and Engineering
Office of the Dean
Proposal to Revise A Program
(Action Item)**

Contact Person: Scott Bonham, scott.bonham@wku.edu, 745-6196

1. Identification of program:

- 1.1 Current program reference number: 734
- 1.2 Current program title: Middle School Science Education (“MSSE”)
- 1.3 Credit hours: 48

2. Identification of the proposed program changes:

- 2.1 Reduce the number of hours in the major from 48 to 46
- 2.2 Drop PHYS 105 from the list of required introductory courses, require only one introductory geology course
- 2.3 Specify a list of required upper level courses
- 2.4 Reduce the restricted electives to 2 hours and remove courses with upper-level pre-requisites
- 2.4 Change program title to “Middle School Science”
- 2.5 Raise minimum GPA to 2.75
- 2.6 Eliminate need for a waiver from requirement of 50% upper level courses

3. Detailed program descriptions:

Current program

Proposed program

<p>General:</p> <ul style="list-style-type: none"> 1. 30 hours of introductory science courses are required. 2. A science research methods course, SMED 360, is required. 3. 15 hours of upper level science courses are required from a list of restricted electives, including courses in three disciplines. 4. Completion of MATH 117 or 118 or 126 as a support course is required. 5. All courses must be completed with a grade of C or better. All science courses must be completed with an average of 2.5 or better. 6. Students must also complete the SMED major. 	<p>General:</p> <ul style="list-style-type: none"> 1. 23 hours of introductory science core courses are required. 2. A science research methods course, SMED 360, is required. 3. 20 hours of upper level science courses are required including a required course in each of the five disciplines and one from a list of restricted electives. 4. Completion of MATH 117 or 136 as a support course is required. 5. All courses must be completed with a grade of C or better. All science courses must be completed with an average GPA of 2.75 or better. 6. Students must also complete the SMED
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	major.
<p>Required introductory science courses</p> <p>ASTR 104 Astronomy of the Solar System (3) or ASTR 106 Astronomy of Stellar Systems (3)</p> <p>BIOL 120/121 Biological Concepts: Cells, Metabolism, and Genetics (4)</p> <p>BIOL 122/123 Biological Concepts: Evolution, Diversity & Ecology (4)</p> <p>CHEM 105/106 Fund. of Gen. Chemistry (4) or CHEM 120/121 College Chemistry I (5)</p> <p>GEOL 111/113 The Earth (4) GEOL 112/114 Earth History (4)</p> <p>PHYS 105 Concepts of Physical World (3)</p> <p>PHYS 201 College Physics I (4) or PHYS 231/232 College Physics and Biophysics I (4)</p>	<p>Required introductory science courses (23 h)</p> <p>ASTR 104 Astronomy of the Solar System (3) or ASTR 106 Astronomy of Stellar Systems (3)</p> <p>BIOL 120/121 Biological Concepts: Cells, Metabolism, and Genetics (4)</p> <p>BIOL 122/123 Biological Concepts: Evolution, Diversity & Ecology (4)</p> <p>CHEM 105/106 Fund. of Gen. Chemistry (4) or CHEM 120/121 College Chemistry I (5)</p> <p>GEOL 111/113 The Earth (4) OR GEOL 112/114 Earth History (4)</p> <p>PHYS 201 College Physics I (4) or PHYS 231/232 College Physics and Biophysics I (4)</p>
<p>Science research course: SMED 360 Research Methods for Mathematics and Science Teachers (3)</p>	<p>Science research course: SMED 360 Research Methods for Mathematics and Science Teachers (3)</p>
<p>Upper level science courses: Restricted electives, 15 hours including three sciences from among:</p> <p>ASTR 405 Astronomy for Teachers (3)</p> <p>PHYS 410 Physics for Teachers (3)</p> <p>BIOL 319/322 Molecular and Cell Biology (4) BIOL 325 Insect Biodiversity (3) BIOL 326 Ornithology (3) BIOL 327 Genetics (4) BIOL 334 Animal Behavior (3) BIOL 348 Plant Taxonomy (3) BIOL 350 Intro Recombinant Genetics (3)</p>	<p>Upper level science courses (20 hours):</p> <p>All of following courses (18 hours): ASTR 405 Astronomy for Teachers (3) BIOL xxx Life Sciences for Middle Grades Teachers (4) CHEM 470 Chemistry/Middle School (4) GEOL 305 Earth Systems Science for Teachers (4)</p> <p>PHYS 410 Physics for Teachers (3)</p> <p>One restricted elective (min. 2 hours) from: BIOL 319/322 Molecular and Cell Biology (4) BIOL 325 Insect Biodiversity (3) BIOL 326 Ornithology (3) BIOL 327 Genetics (4) BIOL 334 Animal Behavior (3) BIOL 348 Plant Taxonomy (3)</p>

BIOL 407 Virology (3) BIOL 411/412 Cell Biology (4) BIOL 430 Evolution: Theory and Process (3) GEOG 427 Water Resources (3) GEOG 471 Natural Resource Mgt. (3) GEOLOG 308 Structural Geology (3) GEOLOG 310 General Hydrology (3) GEOLOG 311 Oceanography (3) GEOLOG 325 Intro Minerals and Rocks (3) GEOLOG 380 Intro Field Techniques (3) GEOLOG 405 Paleontology (3)	GEOG 471 Natural Resource Mgt. (3) GEOLOG 308 Structural Geology (3) GEOLOG 310 General Hydrology (3) GEOLOG 311 Oceanography (3) GEOLOG 325 Intro Minerals and Rocks (3) GEOLOG 380 Intro Field Techniques (3) GEOLOG 405 Paleontology (3)
Support course MATH 117 Trigonometry (3) or MATH 118 College Alg/Trig (5) or MATH 126 Calc/Anal Geo I (4.5)	Support course MATH 117 Trigonometry (3) or MATH 136 Calculus I (4)

4. Rationale for the proposed program change:

This program is designed for future middle school science teachers, who need to be able to teach material from across five science disciplines (Astronomy, Biology, Chemistry, Geology and Physics). Thus, they must complete introductory college-level courses in all of these areas, which leads to a large number of lower-level hours, all of which address core content mandated by the state to be taught in middle school science courses.¹ The Middle Grades Science Education Program is part of the SKyTeach Program for preparing math and science teachers, a cooperative program between the College of Education and Behavior Sciences (CEBS), and Ogden College of Science and Engineering (OCSE). In SKyTeach, all students are double majors, with a math or science content major in Ogden and a pedagogy major, Science and Math Education (SMED), in CEBS.

When this program was first established, there were few upper level courses available that specifically addressed needs of future middle school science teachers, and those that existed were not offered regularly or not available to students at the extended campuses. Thus, a structure with a large number of restricted upper level electives was implemented, although some of the courses on the list served little purpose beyond

¹ The need for introductory science courses in all the disciplines is the reason for the original need for a 6 hour waiver from the rule of 50% upper level courses. All SKyTeach students carry a double major in a content area and in Science and Math Education (SMED), so a broad science content major is needed for the middle school teachers. This revision eliminates the need for such a waiver.

balancing lower level hours with upper level hours. Now, as a result of intensive discussion, all of the science departments have made a commitment to provide on a regular basis to all students (including those at extended campuses) upper level courses that both reinforce content from introductory courses and better prepare students to teach the material at the middle school level. The new program requires all students to take CHEM 470 and PHYS 410, which provide significant overlap with content and pedagogical approaches covered in PHYS 105, so the latter is being dropped, allowing for a reduction in hours in this relatively large major. Students must now take only one of the introductory geology courses to further reduce the number of lower level courses. The addition of these courses means that only one restricted elective course is needed, so courses on the restricted elective list that have as a pre-requisite another course on the list are being removed. With the reduction in lower level courses and the addition of upper level courses, the need for a waiver for this program has been removed.

The title of this program is being changed in order to drop “Education” from the name. The reason for this is that including “Education” in the title has led to some confusion as to what this program is. It is a science content major housed in OCSE, not an education major—students also must complete the Science and Math Education major with their professional education courses in CEBS. However, including the word “Education” in the name of the OCSE program has, on several occasions, given people the impression that this is an education major, and the change is intended to reduce confusion in the future.

The minimum GPA is being raised to 2.75 in compliance with new regulations from the Education Professional Standards Board.

5. Proposed term for implementation and special provisions (if applicable):

Fall semester 2012

6. Dates of prior committee approvals:

SKyTeach Ad Hoc Dean's Committee: 1-25-2012

Departmental Approval: Biology, Chemistry,
Geography & Geology, Physics and Astronomy 1-27-2012

Ogden College Curriculum Committee _____

Professional Education Council _____

Undergraduate Curriculum Committee _____

University Senate _____