WINONA STATE UNIVERSITY
PROPOSAL FOR REVISED PROGRAMS AND NEW PROGRAMS

Use this form to submit proposals for revised majors, minors, concentrations, options, etc.

Note: A department, with its dean’s approval, may change up to two courses per year within an existing major, minor, concentration, option, etc., per year without seeking review of A2C2 and/or graduate Council, provided that (1) the total credits do not increase or decrease for the major, minor, concentration, option, etc., and (2) the change does not affect other departments or the University Studies Program. A2C2 and/or Graduate Council do, however, wish to be informed of these changes. Use form Notifications.

If a department wishes to make more extensive revisions to an existing major, minor, concentration, option, etc., complete and submit this form with the appropriate number of copies. Refer to Regulation 3-4, Policy for Changing the Curriculum, for complete information on submitting proposals for curricular changes.

__________________________
Department: ___GEOSCIENCE____________

Title of Program: ___B.S. Minor - Geoscience______________________________

Revised: ______ Major ______ XX__ Minor ______ Concentration ______ Option ______ Other
New: ______ Major ______ Minor ______ Concentration ______ Option ______ Other

Total credit hours: _24-25 S.H._ ___ Classroom Hours _7-8_____ Lab Hours __17-18_____ 

Proposed Implementation Date: ___Spring Semester 2005___________

Please attach to this proposal a narrative with the following information:

A. Statement of major focus and objectives of the revised program.

B. New Catalog Content
   1. Provide a list of program content as it would appear in the catalog including required courses, electives, etc., by number and name. Include the number and name for each prerequisite, and all prerequisites of proposed prerequisites. All such prerequisites, and prerequisites of prerequisites, should be included in the total credit hour calculations for the revised program.
   2. New catalog narrative, if any.

C. Description of Revisions, to include
   1. A display of current program requirements next to proposed new requirements for clear, easy comparison.
   2. A clear identification of each proposed change.
   3. The following information for each required or elective course:
      a. Course number and name,
      b. A brief course description, and
      c. A brief statement explaining why the program should include the course.

Attach a Financial and Staffing Data Sheet.

Department Contact Person for this Proposal:

__________________________
_Cathy Summa______________ X5269___
csumma@winona.edu_________

Name (please print)  Phone  e-mail address


Include a Financial and Staffing Data Sheet with any proposal for a new course, new program, or revised program.

Please answer the following questions completely. Provide supporting data.

1. Would this course or program be taught with existing staff or with new or additional staff? If this course would be taught by adjunct faculty, include a rationale.

This program would be offered by existing Geoscience Department staff.

2. What impact would approval of this course/program have on current course offerings? Please discuss number of sections of current offerings, dropping of courses, etc.

Offering this program will streamline our current course offerings in that it allows students more flexibility in the courses they choose to include in the minor curriculum. Therefore, faculty will have more freedom in the selection of upper-division electives offered each year because we will find ourselves less tied to teaching specific courses for inclusion in the minor. The specific courses required in this program are offered with great regularity (at least once/year) so that students will have no difficulty (with sufficient advance planning) fitting them into their schedules.

3. What effect would approval of this course/program have on the department supplies? Include data to support expenditures for staffing, equipment, supplies, instructional resources, etc.

No impact. We already budget for supplies and equipment to offer these courses (and electives) for our major programs. Offering them for the minor only means more students may make use of existing equipment. These additional students (few that they are) will have little impact on wear and tear on the equipment.
Routing form for new and revised courses and programs. Course or Program: B.S. Minor – Geoscience (revised)

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Please forward to Registrar.

Registrar
Date entered
Please notify department chair via e-mail that curricular change has been recorded.
Please attach to this proposal a narrative with the following information:

A. Statement of major focus and objectives of the revised program.

The revised Geoscience minor is designed to provide greater flexibility and choice for students. The Earth is a dynamic and evolving place. As we develop greater technological sophistication, and are better able to understand how humans impact their environment, as well as how our planet and others in our solar system function, geoscience has become a much more broad and wide-ranging discipline. Students choosing to minor in Geoscience do so because they have an interest in some facet of earth science. Because the discipline is so broad, it is difficult to anticipate a set of courses that will appeal to all students. Geoscience minors will not become practicing geologists, rather they leave WSU as more liberally educated, well-rounded, informed citizens. Thus, increased flexibility in the minor curriculum enables students to sample Geoscience offerings of interest to the individual. Increased flexibility in course selection in the minor, via the use of a more broad elective option, will ultimately result in increased student numbers in upper-division Geoscience classes, and in greater numbers of students more broadly educated about the planet on which they live.

B. New Catalog Content
1. Provide a list of program content as it would appear in the catalog including required courses, electives, etc., by number and name. Include the number and name for each prerequisite, and all prerequisites of proposed prerequisites. All such prerequisites, and prerequisites of prerequisites, should be included in the total credit hour calculations for the revised program.
2. New catalog narrative, if any.

B.1. B.S. Minor – Geoscience (24-25 S.H.)

**Required Courses (9-10 S.H.):**
- GEOS 120 (4) or GEOS 121 (3) – no prerequisite
- GEOS 130 (4) – prerequisite GEOS 120 or 121
- GEOS 280 (2) – prerequisite ENG 111* and GEOS 130
  (* As discussed by A2C2 last year, we have not included in our program total credit hour requirements the 4 S.H. credits that students take with the ENG 111 prerequisite. This course is required as part of a students Basic Skills component of the University Studies program and is already counted as part of the credits required to graduate.)

**Geoscience Electives (15 S.H.):**
Choose electives from the Geoscience Electives pool. Electives must include at least two laboratory courses numbered 300 or above. Electives may include one course from the Geoscience Introductory pool (courses numbered 100 – 199) other than those listed as required (above)

(**Note: the Geoscience Elective pool is listed as part of Item “C.1” in this document and is not reprinted here. It does not appear in this section of the catalog and is printed only once in the Geoscience section of the catalog. Additionally, it does not change as part of this proposed program revision, and is exactly the same as listed in the current catalog.)

3. The following information for each required or elective course:
   a. Course number and name,
   b. A brief course description, and
   c. A brief statement explaining why the program should include the course.
C.1. A display of current program requirements next to proposed new requirements for clear, easy comparison.

**Geoscience Department**

**Revised Minor Proposal**

**PRESENT MINOR (25-26 S.H.):**

**REQUIRED COURSES (22 S.H.)**
- GEOS 120 (4)
- GEOS 130 (4)
- GEOS 220 (4)
- GEOS 280 (2)
- GEOS 330 (4)
- GEOS 340 (4)

**GEOSCIENCE ELECTIVES (3-4 S.H.)**
May be chosen from any departmental course offerings 300-level and above, except for GEOS 399.

**PROPOSED MINOR (24-25 S.H.):**

**REQUIRED COURSES (9-10 S.H.):**
- GEOS 120 (4) or GEOS 121 (3)
- GEOS 130 (4)
- GEOS 280 (2)

**GEOSCIENCE ELECTIVES (15 S.H.):**
Choose electives from the Geoscience Electives pool.
Electives must include at least two laboratory courses numbered 300 or above. Electives may include one course from the Geoscience Introductory pool (courses numbered 100 – 199) other than those listed as required (above).

**GEOSCIENCE ELECTIVES POOL (FOR ALL GEOSCIENCE MAJORS):**
- GEOS 240 – Watershed Science (4)
- GEOS 315 – Surficial Processes and Soils (4)
- GEOS 325 – Environmental Geoscience (3)
- GEOS 320 – Optical Mineralogy & Petrology (4)
- GEOS 370 – GIS & Imaging Techniques (3)
- GEOS 385 – Geology of North America (3)
- GEOS 399 – Geoscience Internship (1-3)

**GEOSCIENCE INTRODUCTORY POOL**
- GEOS 100 – Minnesota Rocks & Waters (3)
- GEOS 102 – Resources of the Earth (3)
- GEOS 103 – Natural Disasters (3)
- GEOS 104 – Catastrophes and Extinctions (3)
- GEOS 105 – Astronomy with Laboratory (4)
- GEOS 106 – Astronomy (3)

C.2: A clear identification of each proposed change.
The present minor requires 6 specific courses and one elective course. The proposed revision provides students greater choice within the curriculum because it requires only 3 specified courses, and an additional 15 S.H. of elective courses, at least two of which must be laboratory courses numbered 300 or above. This will ensure that students are getting sufficient depth within the discipline, while at the same time providing them greater freedom to follow their individual interests within the discipline. The electives also allow students to elect one additional introductory level course as part of the minor. This option provides students the ability to explore greater breadth within the discipline.

C.3: Course numbers, descriptions and rationale for inclusion in program:

**REQUIRED COURSES:**
The three courses below (GEOS 120, 130, and 280) are REQUIRED in this program. We require these foundational courses so that all students have the basic content (GEOS 120/121), practice at geologic thinking (GEOS 130), and field experiences in application of geologic fundamentals (GEOS 280) to prepare them to take, and be successful in, upper-division geoscience courses. These courses should be included in this program because they provide students the fundamental content of the discipline and opportunities to apply that content to the solution of real geologic problems. These courses are sequenced such that students deal with progressively more complex topics and problems.
GEOS 120 (4) OR GEOS 121 (3) – Dynamic Earth (with or without lab): This is a basic introduction to earth systems and physical geology. It provides students a brief introduction to the breadth of topics included in traditional geologic studies. Topics include: plate tectonics, rocks and minerals, earth structure, surficial processes, and surface and ground water. Inclusion of this course in the minor ensures that all students have the same foundational material to build upon throughout the program.

GEOS 130 (4) – Earth & Life Through Time: This course provides more in-depth coverage of certain topics introduced in the Dynamic Earth, and places these topics into historical perspective. It strives to help students think geologically by solving realistic geologic problems. It challenges students to build upon the fundamentals introduced in the Dynamic Earth by solving weekly homework and lab problems that focus on topics such as geologic mapping, evolution of the earth through time, and interpreting earth history from the rock record.

GEOS 280 (2) – Field & Analytical Techniques I: This course provides students with a semester-long intensive field experience. Each week, students are in the field, tackling real geologic problems, ranging from structural deformation to interpretation of landscape evolution. This course teaches students to use basic field equipment, take sound field notes, and interpret their data. Includes basic surveying and mapping skills, field observation and proper note-taking techniques, use of the geologic compass (brunton compass), and techniques by which geologist catalog and describe surficial and bedrock geology.

The courses below serve as ELECTIVES in the Geoscience minor. They provide a breadth of opportunity/choice for students, while at the same time, tackling advanced problems in the discipline.

ELECTIVE COURSES (15 S.H.)
(Catalog copy) Select from the “Electives Pool” list, except for geoscience courses listed as requirements for the major. Elective choices MUST include at least two laboratory courses (4 S.H.) numbered 300 or above. Choices MAY include one additional course from Geoscience offerings at the 100-level (a student may not select any course already taken as part of the major program for any elective credit).

(Rationale) Electives courses are included in this program to give students a deeper and broader content and skill base in the discipline. Course selection is intentionally left broad, so that a student may elect courses that are most appropriately aligned with his/her interests (potentially as demonstrated by student’s major field). Because geoscience is such a broad discipline, we have chosen to allow our students to select an additional 100-level course as an elective in the program. This option allows the student to gain an introductory level understanding of one of the many subdisciplines in geoscience. However, the bulk of the elective courses must come from upper-division courses. Our intention is that the student will take an additional 4 or 5 courses, depending on the number of laboratory courses the student selects. Note that all students must select at least two additional laboratory course numbered 300 or above. Geoscience is traditionally divided into areas of specialization focusing on surficial processes (GEOS 240, 315, 420 and 425) and analysis of rocks (GEOS 220, 320, 330, 340 and 440). The flexibility of this program allows students to pursue more in-depth study of each of these areas by selecting these courses, or to design a path of their own.

GEOS 100 - Minnesota’s Rocks and Waters—3 S.H.: Introduction to Minnesota’s geological history focusing on such topics as: Minnesota’s rock record and history, fossils, mining, soils, lakes, rivers and ground water. This course provides students an overview of Minnesota’s geological setting.

GEOS 102 – Resources of the Earth –3 S.H.: An investigative exploration of significant global resources with emphasis on fossil fuels, non-fossil fuels, water and other energy resources. Geologic processes governing each are explored. Prediction, impacts, economic and political scenarios are examined. This course provides students an introduction to economic geology.

GEOS 103 - Natural Disasters—3 S.H.: An investigative exploration of significant geohazards impacting the earth with emphasis on volcanoes, earthquakes, landslides and other hill slope failures, hurricanes and tornadoes, pollution and floods. Geologic processes governing each type of disaster are explored. Prediction, impacts and mitigation potential for each hazard are examined. This course provides an introduction to issues of risk assessment and management in a geologic context.

GEOS 104 – Catastrophes and Extinctions – 3 S.H.: Over 99% of the animal species that once inhabited the Earth are now extinct. Remarkably, most of these extinctions have been associated through time with significant geologic events that are considered by many to be catastrophic. In this course, students will explore the major extinctions that
have taken place through geologic history. These include the extinction of numerous marine invertebrate species, the extinction of the dinosaurs 65 million years ago, the extinction of large mammals during the last ice age, and many others. Weekend (overnight) field trip required. Lecture only. This course provides an introduction to topics in paleontology.

**GEOS 105 (4 S.H.) or GEOS 106 (3 S.H.) - Astronomy:** History of astronomy. Study of the planets, their moons, comets, asteroids, meteors and other planetary bodies. Origin of the universe, solar system, sun and other stars. This course provides students an introduction to topics in planetary geology.

**GEOS 110 (4 S.H.) or GEOS 111 (3 S.H.) – Oceanography:** Introduction to oceans including the ocean floor, marine sediments, composition of sea water, ocean currents, waves and tides, marine biology and oceanic resources. This course provides students an introduction to topics in oceanography.

**GEOS 115 (4 S.H.) or GEOS 116 (3.H.) – Meteorology:** Study of earth’s dynamic weather system including atmospheric structure, composition, and processes; origin and development of storms and related phenomena. This course provides students an introduction to topics in meteorology.

**GEOS 220 Minerals and Rocks (4):** In-depth study of minerals, mineral formation, and combination to form rocks related to plate tectonic setting. Rocks record the history of earth events, and as such, are the fundamental tool by which geoscientists interpret the earth. Prerequisite: GEOS 130

**GEOS 240 Watershed Science (4):** Introduction to surficial processes that act to erode and sculpt the landscape. Water is the primary catalyst in all geologic processes on Earth; this course provides students a framework by which to consider water-rock interaction and the impact these processes have on geologic systems. Prerequisite: GEOS 130

**GEOS 295 - Surficial Processes & Soils (4):** Study of the nature and evolution of landforms at or near the Earth’s surface. Includes soil-forming processes and soil classification and analysis. Prerequisite: GEOS 240

**GEOS 320 - Optical Mineralogy and Petrology—4 S.H.:** Theory of optical mineralogy. Optical properties of minerals determined by petrographic microscope. Introduction to major sedimentary, igneous, and metamorphic rocks; mineral equilibria and stability, mineralogic phase rule and metamorphic facies. Rock identification by megascopic and petrographic techniques. Lecture and laboratory. Prerequisite: GEOS 220. This course provides more in-depth study of rocks in thin-section.

**GEOS 325 - Environmental Geoscience—3 S.H.:** Study of geologic and hydrologic processes operating in various terrestrial environments, including how these processes relate to land use, land-use planning and geologic hazards. Includes investigation of impact of human activity on natural systems. Prerequisite: Any University Studies Natural Science Laboratory course or instructor’s permission. This course will be popular with students interested in connecting their work in Geoscience with environmental issues.

**GEOS 330 – Structural Geology (4):** Study of faulting, folding, mechanics of rock deformation and structural techniques. Principles of plate tectonics and mountain building. Prerequisite: GEOS 220

**GEOS 340 – Sedimentology & Stratigraphy (4):** Physical, chemical and biological processes that affect sedimentation and depositional systems. Study of stratigraphic nomenclature and correlation, deposition models, causes of sea-level change, and relationship to plate tectonics. Prerequisite: GEOS 220

**GEOS 370 - GIS and Imaging Techniques—3 S.H.:** Techniques of using aerial photographs, remote sensing, and GIS for geological applications. Prerequisite: CMST 191, GEOS 130, and instructor’s permission. This course will likely be a popular elective in this program because it teaches students a mapping tool that is useful in other courses, as well as in geologic careers.

**GEOS 385 - Geology of North America—3 S.H.:** Study of the physiographic provinces of the North American continent with emphasis on geomorphology, structural history, stratigraphy and mineral deposits of each province. Lecture and laboratory. Prerequisite: GEOS 220. This course provides a regional (North American) framework and greater detail of topics covered in GEOS 130 and GEOS 220.

**GEOS 399 —Internship (2-3):** Supervised governmental agency, business, industrial, or research institution experience designed by Geoscience faculty advisor, work supervisor and student.
GEOS 400—Directed Research (2-3): Independent study of selected geologic field and/or laboratory problem with preparation of written report, poster, and oral presentation supervised by Geoscience faculty advisor.

GEOS 405 - Current Topics in Geoscience—1-3 S.H.: Analysis of current topics and issues relevant to Geosciences. Subject matter and prerequisites will be announced in advance by the department. May be repeated as topics change. This course provides students an option to study a variety of topics, depending on frequency of course availability.

GEOS 420—Applied Hydrogeology (4): Application of hydrologic principles to ground-water flow problems, aqueous geochemistry, and contaminant studies. Techniques of water-well development, aquifer tests, determination of ground-water chemistry, using computer models and other analytical tools of the discipline. Prerequisite: GEOS 240

GEOS 425-Global Climate Change (3): Exploration of the Earth's most recent glacial/interglacial cycles: geological and faunal evidence, the sequence of historical events, potential causative factors, environmental responses and rates of change, and pertinence to contemporary global change. Emphasis placed on understanding the mechanisms of climate change in relation to geological processes. Prerequisites: GEOS 325 or permission of the instructor.

GEOS 430 - Chemistry and Physics of the Earth—3 S.H.: Application of chemical and physical principles to geologic problems. Chemistry of formation of major rock groups. Isotopic and elemental distribution and abundance. Physics of Earth’s interior as determined from study of seismic activity. Application of seismic reflection and refraction principles. Lecture only. Prerequisite: CHEM 212, PHYS 201, GEOS 330 and GEOS 340. This course integrates aspects of physics and chemistry as applied to the study of the earth.

GEOS 440 - Basin Analysis and Tectonics—4 S.H.: Interpretation of the stratigraphic record to understand the development of sedimentary basins in a plate tectonic context. Study of sequence stratigraphy, eustatic changes in sea level, and fluid flow in basins. Lecture and laboratory. Prerequisite: GEOS 340. This course explores topics from GEOS 340 in greater depth and connects those topics in a plate-tectonic framework.

GEOS 480 - Field and Analytical Methods II—1 S.H.: Advanced geologic field techniques including mapping, correlation, and problem solving. Includes some laboratory sample preparation and analysis. Prerequisite: GEOS 280, GEOS 340 and instructor’s permission. This course provides greater field opportunities for students.