WINONA STATE UNIVERSITY
PROPOSAL FOR NEW COURSES

Department: GEOSCIENCE

Course No. GEOS 121 Course Name Dynamic Earth Credits 3

This proposal is for a(n) ___XX__ Undergraduate Course ______ Graduate Course

Applies to: Major Minor XX University Studies*

Required Required

Elective Elective

Prerequisites None

Grading method ___XX__ Grade only _____ P/NC only ______ Grade and P/NC

Option

Frequency of offering: Every semester

*For University Studies Program course approval, the form Proposal for University Studies Courses must also be completed and submitted according to the instructions on that form.

Provide the following information (attach materials to this proposal):

A. Course Description

1. Catalog description.
2. Course outline of the major topics and subtopics (minimum of two-level outline).
3. Basic instructional plan and methods.
4. Course requirements (papers, lab work, projects, etc.) and means of evaluation.
5. Course materials (textbook(s), articles, etc.).
6. List of references.

B. Rationale

1. Statement of the major focus and objectives of the course.
2. Specify how this new course contributes to the departmental curriculum.
3. Indicate any course(s) which may be dropped if this course is approved.

C. Impact of this Course on other Departments, Programs, Majors, or Minors

1. Does this course increase or decrease the total credits required by a major or minor of any other department? If so, which department(s)?
2. List the departments, if any, which have been consulted about this proposal.

D. University Studies Course Proposals

The form Proposal for University Studies Course must also be completed and submitted according to the instructions on that form.

Attach a Financial and Staffing Data Sheet.

Attach an Approval Form.

Department Contact Person for this Proposal:

James Meyers x5266 jmeyers@winona.edu
WINONA STATE UNIVERSITY
FINANCIAL AND STAFFING DATA SHEET

Course or Program: **GEOS 121 Dynamic Earth**

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.

   **Geoscience 121 Dynamic Earth, will be taught by existing 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.

   The Geoscience Department anticipates offering GEOS 121, Dynamic Earth, regularly in association with GEOS 120, Dynamic Earth (a currently approved course satisfying US Natural Science Lab requirements). GEOS 121 will offer students a lecture-only option (3 cr) and GEOS 120 will continue to be lecture plus laboratory (4 cr). Thus, the lecture for both courses will be taught simultaneously. This will give students the option of taking the course for lab or non-lab credit. In semesters when faculty teaching loads do not permit an additional laboratory course, GEOS 121 may be offered alone without the option of enrolling in GEOS 120 for lab credit.

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.

   None. **Existing resources (for GEOS 120) will be utilized in this course.**
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Please forward to Registrar.

Registrar recorded. | Please notify department chair via e-mail that curricular change has been recorded.
| Date entered         |
A. Provide a Description of the Course

GEOS 121: Dynamic Earth
3-credits

About the Course

This class is an introduction to the way the Earth works. Through the term, we will investigate what the Earth is made of and how natural processes change both the surface and interior of the Earth through time. Major ideas and principles that govern the modern science of geology will be applied to solve basic geologic problems.

This course additionally qualifies as a University Studies course satisfying the outcomes of the Natural Science Category. If you successfully complete the course requirements, you will earn 3 credits toward completion of the non-laboratory Natural Science category of the University Studies Program.

University Studies Outcomes

The purpose of the Natural Science requirement in the University Studies program is to provide students with the tools to understand and be able to apply the methods by which scientific inquiry increases our understanding of the natural world.

These courses must include requirements and learning activities that promote students' abilities to...

a. understand how scientists approach and solve problems in the natural sciences;
b. apply those methods to solve problems that arise in the natural sciences;
c. use inductive reasoning, mathematics, or statistics to solve problems in natural science;
d. engage in independent and collaborative learning;
e. identify, find, and use the tools of information science as it relates to natural science;
f. critically evaluate both source and content of scientific information; and
g. recognize and correct scientific misconceptions.

Courses that satisfy the laboratory requirement in the Natural Sciences will additionally provide students the opportunity to practice scientific inquiry through hands-on investigations and to analyze and report the results of those investigations.

Course activities described throughout the remainder of this syllabus will be coded to the above list of outcomes by the corresponding letter. These outcomes will be integrated throughout course content—each new topic will be presented in a manner in which the student will be able to understand and apply the methods by which scientists approach and solve problems in the natural sciences, using inductive reasoning or mathematics (outcomes a-c). Common scientific misconceptions will be identified at the start of each topic, and class material will be directed toward correcting those misconceptions (outcome g). You will be asked to work collaboratively on certain in-class activities and laboratory exercises and independently on exams (outcome d). In-class assignments and work outside of class will require that you utilize the textbook, the textbook CD-ROM, and other sources to critically evaluate scientific information as it relates to geology (outcomes e, f).

Course Website

Course information, lecture and lab schedules, review sheets for exams, and interesting links related to geology are posted at: http://winona.edu/geology/dynamicearth/index.html

You must consult this web site daily for important information and assignments related to dynamic earth.

Instructional plan

The course will consist of three discussion/lecture sessions each week. Discussion/lecture sessions will be supplemented with audio-visual materials in an effort to bring field examples into the classroom.
It is very important that you thoroughly read the assigned material in the text before each meeting in order to better understand and participate in the discussions and lectures. For every class period, students will be assigned a "warm-up" exercise, to be completed using the course web page.

We will use "Blackboard" to complete and submit these warm-ups. Go to <http://bb.winona.edu> log in and click on the course "dynamic earth." You will find the link to warm-ups in the course announcement section, and also in the course assignment section. Instructions for using blackboard are given in a separate web page.

One essay and two multiple-choice questions should be completed and electronically submitted to the instructor using the submit button at the bottom of the warm-up page. Students will receive credit for completing the "warm-ups", which will count 15% of the course grade. Each warm-up must be submitted by 7 a.m. the day of the class meeting for which it is assigned, or no credit will be given. The instructor will read all warm-ups and will then base the discussion/lecture session on student responses. Misconceptions that emerge from the warm-ups will be addressed in class. Remember that the warm-ups are your opportunity to influence the course of each classroom meeting.

Regular assignments will be made from supplementary handouts, and some of these will be turned in for evaluation. Also note that an interactive CD-ROM is provided with the text. You should make regular use of the materials and exercises provided therein, including the self-testing sections.

Course requirements

Prerequisites: This course is designed to stimulate your thinking (outcomes a, b, c, f, g), but there are no prerequisite courses. If you can balance your checkbook, you can do all the math that will be required (outcome c). I will expect you to understand and apply fundamental concepts (outcomes a, b, c, c, f, g), rather than to simply memorize information, on exams. You should strive to achieve as complete and sound a scientific interpretation as possible by trying to integrate information across discrete chapters of the text.

Study Groups: Because scientific understanding does not usually progress in a vacuum—it is through discussions and arguments with colleagues that most advances stem—I encourage you to work in groups and to discuss your ideas and to work through confusing concepts with your classmates. One of the best ways to study and understand and learn is to form a small study group—quiz one another. Make up questions that you think I'd ask on the exam, and be certain you can answer them. If you can accurately explain a concept to your peers, then you can feel comfortable that you understand it. If you're confused in doing this, you're likely to be confused about the material. (outcome d)

Attendance: Attendance at discussion/lecture sessions is essential for succeeding in the course. Warm-ups will be the focus of each meeting. While material in the warm-ups will be emphasized, students are responsible for the breadth and depth of the textbook reading when it comes to exams.

Completion of all lecture exams is required in order to receive a passing grade. Achievement of a passing grade for all course work is required to receive credit for the course.

Testing and grading:

Four lecture exams will be given. The fourth lecture exam will be given during the final exam period and is comprehensive in scope, with an emphasis on material from the last part of the course that was previously untested.

Lecture exams will constitute 80% of the grade. Exams are weighted as follows: #1=15% #2=20% #3=20%,#4=25%. Warm-ups will count 20% of the grade. The grading scale for the weighted course percentage is:

A >80
B 70-79
C 60-69
D 50-59
F <50
Exams are announced well in advance and students are obliged to take exams at the scheduled times. The obvious reason for the exam policy is fairness to the entire class. If you do not think you can abide by this policy, you should drop the course as soon as possible.

If you miss an exam, you are expected to take a make-up. Note that a penalty of 10% of the maximum points attainable per late day will be deducted from the score of those who miss an exam because of an unexcused absence. Examples of unexcused absences include but are not limited to: attendance at weddings, convenient rides home, oversleeping, and unpreparedness. Examples of excusable absences include verifiable illness and family emergency. For excused absences, prior notice must be given by contacting the instructor before the scheduled time of the examination. And written documentation verifying the necessity for the absence must be presented to the instructor before taking the makeup exam.

For excused absences, you must take the test the following weekday of the emergency day, or the deduction penalty goes into effect. If you are in doubt of the status of a pending absence, discuss the matter with the instructor prior to the examination date.

Dishonesty on an exam constitutes failure in the course. During testing times, students are expected to sit as far from neighbors as possible and to keep their answers secure. Different versions of each exam will be distributed throughout the class to provide greater assurance of honest assessment.

Disabilities:
If you have a physical or cognitive disability, please come talk to me as soon as possible so that we can discuss how best to accommodate your needs.

Consultation:
You are urged to consult with me concerning questions and/or problems dealing with the course. My office is PA 114-H, and hours are posted on the door and in our announcements section of the web page. If these hours are in conflict with your schedule, please see me for an appointment. Do not wait until the latter part of the course to get help!

Only if you get assistance early in the semester will I be able to assist you in maximizing your learning potential.

Course outline and reading assignments:

I. Introduction - Chapter I
A. Physical geology - scope
B. Dynamic Earth
   1. Interaction between processes and materials - earth systems
   2. Energy sources
   3. Plate tectonics
   4. Context of geologic time
C. Plate tectonics as a unifying theory
D. Plate tectonics and the rock cycle
E. Geologic time and uniformitarianism

II. Minerals - Ch. 2
A. Atoms, elements and bonding
B. Physical properties of minerals
   1. Controlled by composition, structure and bonding
   2. Description
C. Silicate minerals
D. Other important rock-forming minerals - carbonates
E. Origin of minerals

F. Mineral identification

III. Igneous rocks and intrusive igneous activity - Ch. 3
A. Composition, texture and viscosity of magmas and lavas
B. Origin and evolution of magma and lava
   1. Plate tectonic settings
   2. Bowen's Reaction Series
C. Crystallization - texture and composition of igneous rocks
D. Classification and identification of igneous rocks
E. Intrusive igneous bodies

IV. Volcanism-Ch. 4
A. Materials - Gas, lava and pyroclastic materials
B. Types of volcanic activity and related structures and landforms
C. Distribution of volcanoes relative to plate boundaries and relationship to type of activity and composition of resulting rocks
V. Mechanical and chemical weathering and soil - Ch. 5
A. Mechanical weathering
B. Chemical weathering
C. Influence of rock type and climate on rates of weathering - differential weathering
D. Soil profiles, types, and relationship to climate
E. Factors controlling soil formation

VI. Sediment and Sedimentary rocks - Ch. 6
A. Product of weathering, erosion, deposition and lithification
B. Terrigenous and chemical sedimentary rocks
C. Interpretation of sedimentary rocks, based upon composition, textures and sedimentary structures
D. Sedimentary facies
E. Sedimentation and plate tectonics
F. Sedimentary rocks and natural resources

VII. Metamorphism and metamorphic rocks - Ch. 7
A. Agents and environments of metamorphism
B. Contact and regional metamorphism
C. Classification and identification of metamorphic rocks
D. Concept of metamorphic zones - use of mineral assemblages to interpret temperature and pressure (and hence depth) of formation
E. Relationship between metamorphic rocks, plate tectonics, and mountain building

VIII. Geologic time and Earth history - Ch. 8
A. Early concepts and recognition of geologic time
B. Geologic time and its reckoning
   1. relative dating and correlation
   2. absolute dating
   3. Geologic column and geologic time scale

IX. Earthquakes-Ch. 9
A. Earthquake waves and elastic rebound theory
B. Location of earthquakes - travel-time curves
C. Earthquake intensity and magnitude
D. Earthquakes and plate tectonics
E. Earthquake prediction

X. Earth's interior - Ch. 10
A. Deduced from earthquake waves and meteorites
B. Core, mantle and seismic tomography, crust, lithosphere and asthenosphere
C. Earth's internal heat
D. Isostasy
E. Earth's magnetic field

XI. The Ocean Floor - Ch. 11
A. Continental margins
B. Deep-ocean basins
C. Deep-sea sedimentation
D. Structure and composition of ocean crust

XII. Plate tectonics: a Unifying Theory - Ch. 12
A. Continental drift
B. Sea-floor spreading
   1. Magnetic reversal evidence
   2. Sea-floor sediment evidence
   3. Sea-floor topography evidence
D. Plate tectonics
   1. Types of plate boundaries
   2. Plate motion and its causes

XIII. Deformation, Mountain Building and the Evolution of Continents - Ch. 13
A. Deformation
   1. Folds
   2. Joints
   3. Faults
B. Mountains and mountain building and relationship to plate boundaries
C. Microplates and mountain building
D. Origin and evolution of continents

XIV. Mass movement - Ch. 14
A. Forces
B. Initiation (and prevention) of mass wasting
C. Classification and types of mass wasting based upon rate of movement and mechanics of movement
D. Prevention of mass wasting

XV. Running Water - Ch. 15
A. Hydrologic cycle
B. Controls on surface runoff
C. Sheet flow and channel flow
D. Hydraulics of stream flow and the question of the graded stream
E. Stream erosion
   1. bed load, suspended load and dissolved load
   2. landforms
F. Stream deposition
G. Streams and the landscape
   1. drainage basins and drainage patterns
   2. forms associated with stream valleys
   3. cycle of erosion and concept of base level
XVI. Groundwater systems - Ch. 16
A. Porosity and permeability
B. Storage and flow of groundwater - concept of water table
C. Movement of ground water
D. Aquifers, springs and wells
E. Landscapes associated with groundwater solution
F. Modifications of the groundwater system and their effects
G. Hot springs and geysers

XVII. Glacial systems - Ch. 17
A. Origin of glaciers and history of glaciation
B. Glacial budget and ice movement
C. Types of glaciers
D. Glacial erosion and deposition - associated landforms
   1. Alpine landscapes
   2. Landscapes associated with continental glaciation
E. Regional, continental and global effects of glaciation
F. Glaciers and isostasy
G. Causes of glaciation

Text:

B. Rationale for the New Course

Major Focus and Course Objectives
1) Each student will have a working knowledge of internal and external earth processes.
2) Each student will be able to relate earth processes to the formation of rocks
3) Each student will be able to relate earth processes to the formation of landscapes
4) Each student will be able to describe the Earth as a complex system in which earth processes and earth materials interact.
5) Each student will be able to describe the interaction of earth materials and processes in terms of a system in dynamic equilibrium.
6) Each student will understand the consequences of disrupting natural systems in dynamic equilibrium, in order to better plan for human uses of the earth’s surface and its resources.

How the Course Will Contribute to Geoscience Department Curriculum
The existing laboratory course (GEOS 120) is a required course for all Geoscience majors. By offering Dynamic Earth in a lecture-only option, (GEOS 121), we bring this course in alignment with our other introductory level courses that explore topics of general interest in geoscience for the general university student population. In addition to providing an opportunity for our majors to learn about Earth processes and materials, Dynamic Earth helps students develop skills at analyzing data and quantifying trends and patterns. This course also adds to our departmental goal of providing major and non-major students with a broad range of introductory courses of topical interest.

Courses which may be dropped
None.

C. Provide a Statement of the Impact of this Course on Other Departments....

Clearly State the Impact of this Course on Course Taught in Other Departments
No impact on courses taught in other departments is anticipated. This course does not duplicate the content of courses taught in other departments. There is no anticipated effect on prerequisites.

Would Approval of this Course Change the Total Number of Credits Required by any Major....
No.

Impact on the Major or Minor of Another Department
None anticipated.

D. University Studies Program
If approved by the CPPS, this course will be submitted for approval in the University Studies program as a course satisfying the Arts & Science Core: Nature Science requirements (non-laboratory).