

# REAL Curriculum Program Alignment Proposal

Department or School: Enter dept/school name: Geology Date: October 7, 2020

Degree type:  BS  BA  BBA  BSN  BM  BFA  BSW  Minor  Certificate

Program: Enter program name including concentration, etc. Geology Major, Bachelor of Science, Earth Science Concentration

REAL Area Program Designation Sought (check all that apply):  R  E  A  L

Dept/School Contact: Jonathan Tso (jtso@radford.edu)

BS/BA Requirements: BS Requirement: ASTR 111 (4) and CHEM 111 (4)

- Any degree program that fulfills a REAL area must include at least 9 unique credit hours for each area covered. At least 3 of these 9 credit hours must be at the 300 level or above
- A single major degree program may fulfill no more than three REAL areas for any one student, unless all four REAL areas are fulfilled by accreditation or licensure requirements.
- A single minor or certificate degree program may fulfill no more than two REAL areas.
- Degree program may cover up to two REAL areas using a single prefix.
- All courses documenting the coverage of a REAL area must fulfill all learning outcomes and be designated in that area.
- All courses that document fulfillment of a REAL area within a degree program of study are NOT required to be taught by the department/school. However, departments/schools are expected to formally communicate with other departments about reliance on and inclusion of courses in their degree program plans of study. Indicate this through signature of chair or director of the partnering department or school in the areas below.
- Departments or schools that seek to fulfill REAL areas must acknowledge assessment requirements for those areas. Assessment of degree seeking students is required to be conducted yearly by the department or school offering the degree program.
- If departments or schools want to use a menu of courses to fulfill a particular area, please duplicate the sections below for each REAL area and include information for each course included in the menu of options.
- Please save this file for submission as PROGRAM NAME\_ProgramType.docx (Example: Criminal Justice\_BS.docx)

By signing, the department/school acknowledges the above conditions and considerations:

Dept/School Signature	Date:
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**Official Program Description:**

Please paste the entire official program description from the Radford University catalog in the space within this box. Find those here: <https://catalog.radford.edu/>

Please note that every department/school will have to submit a catalog change proposal for program that asks the Registrar's Office to insert language about the program coverage of the REAL areas into the official Radford University catalog upon approval.

**Geology B.S.****Required Major Core Courses (28 credits)**

GEOL 120 – Earth Science and Society (3)  
GEOL 121 – Earth Science and Society Laboratory (1)  
GEOL 105 – Exploring Earth (4)  
GEOL 106 – It's About Time: A History of Earth, Life, and Global Change (4)  
GEOL 310 – Mineralogy (4)  
GEOL 312 – Igneous and Metamorphic Petrology (4)  
GEOL 440 – Structural Geology (4)  
GEOL 441 – Geologic Field Methods (4)

**Earth Sciences Concentration****Teaching Licensure (54-55 semester hours)**

Additional Required Courses (8 credits)

GEOL 365 – Earth's Ocean and Climate Systems (4)

**Plus** any one of the following:

GEOL 320 – Sedimentary Petrology and Stratigraphy (4)  
GEOL 361 – Geology of Virginia (4)  
GEOL 461 – Regional Geology of the United States (4)

Other Required Courses (6-7 credits)

An additional six to seven semester hours from the following:

STAT 200 – Introduction to Statistics (3)

Choose one course from the following:

MATH 138 – Precalculus II (3); MATH 168 – Calculus with Integrated Precalculus I; (3); MATH 169 – Calculus with Integrated Precalculus II (3); MATH 171 – Calculus and Analytic Geometry I (4)

Additional Requirements (4 credits)

An additional 4 semester hours selected from the following:

ASTR 112 – General Astronomy II (4)  
BIOL 105 – Biology for Health Sciences (4)  
BIOL 131 – Ecology and Adaptation (4)  
GEOL 335 – General Paleontology (4)  
PHYS 111 – General Physics (4)  
PHYS 301 – Atmospheric Physics (4)

B.S Requirement (8 credits)

ASTR 111 – General Astronomy I (4)

CHEM 111 – General Chemistry I (4)

Education Courses (36 credits)

(Contact the Associate Dean of the College of Education and Human Development for information concerning these courses.)

**Total Credits Needed for Degree (120-121)**

## SCIENTIFIC AND QUANTITATIVE REASONING

<p>R Area: Course Prefix: GEOL Course Number: 105 Course Title: Exploring Earth Credit Hours: 4 New course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Revised course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Projected student enrollment per academic year: 200</p>	<p>Is this course required or an elective for your degree program? <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective Is this course offered within your dept/school? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, collaborating dept/school must also complete the remaining elements, and must sign below.  Course Rotation: <input checked="" type="checkbox"/> Fall <input checked="" type="checkbox"/> Spring <input checked="" type="checkbox"/> Intersession <input type="checkbox"/> Other (Explain below)  Intended Frequency: <input checked="" type="checkbox"/> Every academic year <input checked="" type="checkbox"/> Every semester <input type="checkbox"/> Every other year <input type="checkbox"/> At least once every three years <input type="checkbox"/> Other  Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if not offered in dept/school:</p>
<p>R Area: Course Prefix: GEOL Course Number: 106 Course Title: It's About Time: A History of Earth, Life and Global Change Credit Hours: 4 New course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Revised course: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  Projected student enrollment per academic year: 20</p>	<p>Is this course required or an elective for your degree program? <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective Is this course offered within your dept/school? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, collaborating dept/school must also complete the remaining elements, and must sign below.  Course Rotation: <input type="checkbox"/> Fall <input checked="" type="checkbox"/> Spring <input type="checkbox"/> Intersession <input type="checkbox"/> Other (Explain below)  Intended Frequency: <input checked="" type="checkbox"/> Every academic year <input type="checkbox"/> Every semester <input type="checkbox"/> Every other year <input type="checkbox"/> At least once every three years <input type="checkbox"/> Other  Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if not offered in dept/school:</p>
<p>R Area: Course Prefix: GEOL Course Number: 310 Course Title: Mineralogy Credit Hours: 4 New course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Revised course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Projected student enrollment per academic year: 15</p>	<p>Is this course required or an elective for your degree program? <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective Is this course offered within your dept/school? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, collaborating dept/school must also complete the remaining elements, and must sign below.  Course Rotation: <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Intersession <input type="checkbox"/> Other (Explain below)  Intended Frequency: <input checked="" type="checkbox"/> Every academic year <input type="checkbox"/> Every semester <input type="checkbox"/> Every other year <input type="checkbox"/> At least once every three years <input type="checkbox"/> Other  Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if not offered in dept/school:</p>
<p>R Designated Course Required within the Program of Study Approved for Inclusion in the General Education Coursework: (please list at least one, can also be listed above but does not need to be) GEOL 120, GEOL 121, GEOL 105, GEOL 106</p>	

<p>R Area: Learning Goal: To apply scientific and quantitative reasoning to questions about the natural world, mathematics, or related areas.</p>	
<p>Learning Outcome 1: Students apply scientific and quantitative information to test problems and draw conclusions.</p>	<p>Description of learning outcome assessment plan: Data will be collected from the REAL General Studies Minor assessments conducted in the student's senior year. The data will be analyzed yearly by the Geology Department's assessment committee to determine the effectiveness of the course in meeting the learning objectives. Results will be incorporated into the course's improvement plan.</p>
<p>Learning Outcome 2: Students evaluate the quality of data, methods, or inferences used to generate scientific and quantitative knowledge.</p>	<p>Description of learning outcome assessment plan: Data will be collected from the REAL General Studies Minor assessments conducted in the student's senior year. The data will be analyzed yearly by the Geology Department's assessment committee</p>

01/14/2020

	to determine the effectiveness of the course in meeting the learning objectives. Results will be incorporated into the course's improvement plan.
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Additional information for REAL Council consideration:
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Are existing material resources adequate to support this program alignment proposal?

Yes  No If not, what additional material resources would be needed?

Are existing space resources adequate to support this program alignment proposal?

Yes  No If not, what additional space resources would be needed?

Are existing human resources adequate to support this program alignment proposal?

Yes  No If not, what additional human resources would be needed?

Department Curriculum Committee Recommendation:	Signature:	Date:
Chair/Dean on Behalf of Dept/School:	Signature:	Date:
College Curriculum Committee Approval:	Signature:	Date:
Dean/AVP Approval:	Signature:	Date:
REAL Council Recommendation:	Signature:	Date:
Faculty Senate Curriculum Committee Recommendation:	Signature:	Date:
Faculty Senate Approval:	Signature:	Date:
Provost Approval:	Signature:	Date:

# REAL Curriculum Program Alignment Proposal

Department or School: Enter dept/school name:Geology

Date: October 7, 2020

Degree type: BS BA BBA BSN BM BFA BSW Minor Certificate

Program: Enter program name including concentration, etc. Geology Major, Bachelor of Science, General Geology Concentration; Bachelor of Science, Engineering and Environmental Sciences Concentration

REAL Area Program Designation Sought (check all that apply):  R  E  A  L

Dept/School Contact: Jonathan Tso (jtso@radford.ed)

BS/BA Requirements: BS Requirement: 8 hours of Physics (Typically PHYS 111:112)

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 GEOL 121 – Earth Science and Society Laboratory (1)  
 GEOL 105 – Exploring Earth (4)  
 GEOL 106 – It's About Time: A History of Earth, Life, and Global Change (4)  
 GEOL 310 – Mineralogy (4)  
 GEOL 312 – Igneous and Metamorphic Petrology (4)  
 GEOL 440 – Structural Geology (4)  
 GEOL 441 – Geologic Field Methods (4)

**General Geology Concentration (38-40 semester hours)**

Additional Required Courses (23 credits)

GEOS 250 – Introduction to GIS (4)  
 GEOL 320 – Sedimentary Petrology and Stratigraphy (4)  
 GEOL 460 – Senior Seminar in the Geological Sciences (3)

Plus any three from the following:

GEOS 315 – Intermediate GIS (4) **or** UAS 408 – Spatial Data Applications for Unmanned Aerial Systems (4)  
 GEOL 335 – General Paleontology (4)  
 GEOL 360 – Geomorphology (4)  
 GEOL 361 – Geology of Virginia (4)  
 GEOL 365 – Earth's Ocean and Climate Systems (4)  
 GEOL 406 – Geophysics (4)  
 GEOL 455 – Principles of Engineering Geology (4)  
 GEOL 461 – Regional Geology of the United States (4)  
 GEOL 474 – Hydrogeology (4)

Related Requirement (15-17 credits)

STAT 200 – Introduction to Statistics (3)  
 MATH 168:169 – Calculus with Integrated Precalculus I and II (3:3) **or** MATH 171 – Calculus and Analytic Geometry I (4)  
 CHEM 111 – General Chemistry (4)  
 CHEM 112 – General Chemistry (4)

**B.S Requirement**

Bachelor of Science students must take eight hours of physics.

**Total Credits Needed For Degree (120)****Engineering and Environmental Geosciences Concentration (42-44 semester hours)**

## Additional Required Courses (27 credits)

GEOS 250 – Introduction to GIS (4)

GEOS 315 – Intermediate GIS (4) **or** UAS 408 – Spatial Data Applications for Unmanned Aerial Systems (4)

GEOL 320 – Sedimentary Petrology and Stratigraphy (4)

GEOL 406 – Geophysics (4)

GEOL 455 – Principles of Engineering Geology (4)

GEOL 460 – Senior Seminar in the Geological Sciences (3)

GEOL 474 – Hydrogeology (4)

## Related Requirement (15-17 credits)

STAT 200 – Introduction to Statistics (3)

MATH 168:169 Calculus with Integrated Precalculus I and II (3:3) **or** MATH 171 – Calculus and Analytic Geometry I (4)

CHEM 111 – General Chemistry (4)

CHEM 112 – General Chemistry (4)

**B.S Requirement**

Bachelor of Science students must take eight hours of physics courses.

**Total Credits Needed For Degree (120)**

## SCIENTIFIC AND QUANTITATIVE REASONING

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01/14/2020

	to determine the effectiveness of the course in meeting the learning objectives. Results will be incorporated into the course's improvement plan.
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Additional information for REAL Council consideration:
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## APPLIED LEARNING

<p>L Area:  Course Prefix: GEOL  Course Number: 441  Course Title: Geologic Field  Methods  Credit Hours: 4  New course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Revised course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No    Projected student enrollment  per academic year: 15</p>	<p>Is this course required or an elective for your degree program? <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective  Is this course offered within your dept/school? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  If no, collaborating dept/school must also complete the remaining elements, and must sign below.    Course Rotation: <input type="checkbox"/> Fall <input checked="" type="checkbox"/> Spring <input type="checkbox"/> Intersession <input type="checkbox"/> Other (Explain below)    Intended Frequency: <input checked="" type="checkbox"/> Every academic year <input type="checkbox"/> Every semester <input type="checkbox"/> Every other year  <input type="checkbox"/> At least once every three years <input type="checkbox"/> Other    Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if  not offered in dept/school:</p>
<p>L Area:  Course Prefix: GEOL  Course Number: 460  Course Title: Senior Seminar in  the Geological Sciences  Credit Hours: 3  New course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Revised course: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No    Projected student enrollment  per academic year: 15</p>	<p>Is this course required or an elective for your degree program? <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective  Is this course offered within your dept/school? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No  If no, collaborating dept/school must also complete the remaining elements, and must sign below.    Course Rotation: <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Intersession <input type="checkbox"/> Other (Explain below)    Intended Frequency: <input checked="" type="checkbox"/> Every academic year <input type="checkbox"/> Every semester <input type="checkbox"/> Every other year  <input type="checkbox"/> At least once every three years <input type="checkbox"/> Other    Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if  not offered in dept/school:</p>
<p>L Area:  Course Prefix: GEOS  Course Number: 250  Course Title: Introduction to GIS  Credit Hours: 4  New course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  Revised course: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No    Projected student enrollment  per academic year: 80</p>	<p>Is this course required or an elective for your degree program? <input checked="" type="checkbox"/> Required <input type="checkbox"/> Elective  Is this course offered within your dept/school? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  If no, collaborating dept/school must also complete the remaining elements, and must sign below.    Course Rotation: <input checked="" type="checkbox"/> Fall <input checked="" type="checkbox"/> Spring <input checked="" type="checkbox"/> Intersession <input type="checkbox"/> Other (Explain below)    Intended Frequency: <input checked="" type="checkbox"/> Every academic year <input type="checkbox"/> Every semester <input type="checkbox"/> Every other year  <input type="checkbox"/> At least once every three years <input type="checkbox"/> Other    Signature of collaborating chair/director indicating acknowledgement for inclusion and designation if  not offered in dept/school:</p>
<p>L Designated Course Required within the Program of Study Approved for Inclusion in the General  Education Coursework: (please list at least one, can also be listed above but does not need to be)</p>	

<p>L Area:  Learning Goal: To explore professional practice through the application of knowledge, skills, and  critical reflection.</p>	
<p>Learning Outcome 1: Students apply  acquired knowledge and skills to  develop professional identity or  professional practice.</p>	<p>Description of learning outcome assessment plan:  Assessment will be conducted in both GEOL 441 and 460 through  written assignments and oral presentations. The data will be analyzed  yearly by the Geology Department's assessment committee to  determine the effectiveness of the course in meeting the learning  objectives. Results will be incorporated into the course's  improvement plan.</p>
<p>Learning Outcome 2: Students  critically reflect on their learning,  abilities, experiences, or role within  professional contexts.</p>	<p>Description of learning outcome assessment plan:  Assessment will be conducted in both GEOL 441 and 460 through  written assignments and oral presentations. The data will be analyzed  yearly by the Geology Department's assessment committee to  determine the effectiveness of the course in meeting the learning</p>

01/14/2020

	objectives. Results will be incorporated into the course's improvement plan.
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Additional information for REAL Council consideration:
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Are existing material resources adequate to support this program alignment proposal?

Yes  No If not, what additional material resources would be needed?

Are existing space resources adequate to support this program alignment proposal?

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Are existing human resources adequate to support this program alignment proposal?

Yes  No If not, what additional human resources would be needed?

Department Curriculum Committee Recommendation:	Signature:	Date:
Chair/Dean on Behalf of Dept/School:	Signature:	Date:
College Curriculum Committee Approval:	Signature:	Date:
Dean/AVP Approval:	Signature:	Date:
REAL Council Recommendation:	Signature:	Date:
Faculty Senate Curriculum Committee Recommendation:	Signature:	Date:
Faculty Senate Approval:	Signature:	Date:
Provost Approval:	Signature:	Date: