# Program Change Request

## New Program Proposal

**Date Submitted:** 11/28/16 2:01 pm  
**Viewing:** GEOL-CRTG: Graduate Certificate in Environmental Geology  
**Last edit:** 04/11/17 8:58 am  
**Changes proposed by:** jakubaus

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<th>Certificate</th>
<th>Department/Program</th>
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<th>Department(s)</th>
<th>Environmental Studies</th>
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<th>Program Name</th>
<th>Graduate Certificate in Environmental Geology</th>
<th>Location(s) of Instruction</th>
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<th>Do you intend for this program to be offered online?</th>
<th>No</th>
<th>Effective Catalog</th>
<th>2018 - 2019</th>
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## Program Description

In concert with the proposed Professional Science Masters in Environmental Geology (PSM-EG) degree (see related proposal), we propose a Graduate Certificate in Environmental Geology. The certificate consists of the graduate science courses from the PSM-EG. This certificate can be completed as a stand-alone graduate certificate; as a graduate certificate paired with an appropriate graduate degree that the student is simultaneously enrolled in; or as a precursor to starting the full PSM-EG program.

**Demand/Need for the Program**
This certificate will directly respond to workforce needs in the Greater Kansas City metro area for environmental professionals with graduate training in this subject. The environmental services industry, exemplified in the Kansas City metro area by such major companies as Black & Veatch, Burns & McDonnell, Bartlett & West, and numerous other companies, is a growing sector for employment for geology graduates, eclipsing the oil & gas industry for the first time in 2014 (Appendix 1). Data from the American Geosciences Institute Geoscience Student Exit Survey conducted for the 2014-2015 academic year indicated that for the first time, environmental services hired more geoscience graduates than the oil and gas industry (Appendix 1). The survey notes: “For the first time since AGI began the Geoscience Student Exit Survey, an industry, other than oil and gas, hired the most bachelor’s graduates. Anecdotal discussions have focused on the increasing job market within the environmental services industry, and this year’s data supports the viability of this industry for geoscience graduates.” [Geoscience Currents # 108].

Region-specific employment projections and reports from EMSI (Appendix 2), obtained via the MidAmerica Regional Council (MARC), indicate that the employment outlook in the KC metro area is favorable for graduates of a professional environmental geology program. Job growth till the year 2025 is projected to exceed 50% for “Geoscientists, Except Hydrologists and Geographers” [Code 19-2042], with median earning of >$40/hour; Employment in this code nationally is projected by the Bureau of Labor Statistics to increase by 16% during the period 2012-2022. Growth for Hydrologists [Code 19-2043] till the year 2025 is anticipated to be 20%, with similar hourly wage rates. The Bureau of Labor Statistics further notes that, “Job opportunities should be excellent for geoscientists, but particularly those who earn a master’s degree.”

An in-depth review of the Kansas City Metropolitan area job market showed 94 current openings and expected increases in demand ranging from 6% to 17% between now and 2022 for the following job titles: Environmental Science and Protection Technicians, Including Health (SOC 19-4091), Environmental Scientists and Specialists, Including Health (SOC 19-2041), Geoscientists, Except Hydrologists (SOC 19-2042), and Natural Science Managers (SOC 11-9121). Data from the Bureau of Labor Statistics indicates that an estimated 550 professionals are employed in the Greater Kansas City Metropolitan Area as “Environmental Scientists and Specialists”, with a mean annual income of $62,280. Including additional titles that fall under the broader description of environmentally-related professionals (hydrologists, soil scientists, environmental science technicians, etc) increases that to over 4000 environmental professionals with a mean salary of $55,600.

Comparative/Locational Advantage

The greater Kansas City metropolitan area is home to several regional federal environmental agencies including the US Army Corps of Engineers (Kansas City District) and the US Environmental Protection Agency (Region 7), numerous large and small private environmental/ engineering companies (e.g., Black & Veatch, Bartlett & West, Wilson and Company, URS Engineering, AquaTerra Environmental Services, Parner Engineering, Terracon Engineering, Burns and McDonnell, Ecology and Environment Inc., Cardno), and state and local environmental agencies. This concentration of environmental agencies/companies offers several strong advantages: first, a large latent pool of students for the program; second, employment opportunities in these companies and agencies for our students; and third, a pool of environmental professionals to draw upon for lecturers/professors-of-practice for our courses and for our External Advisory Board. We have already drawn upon professional geologists in the metro area for a focus group to define the need for and the ideal structure/content for an applied environmental geology program (see Appendix 3 for the member of this group).

Admission Requirements

Persons applying to the Graduate Certificate in Environmental Geology should hold a bachelor’s degree from an accredited institution, with an undergraduate major in the natural, physical, or applied sciences, engineering, or related fields, OR coursework of at least 20 credit hours in the natural and applied sciences (biology, chemistry, geology, physical geography, environmental sciences, or engineering). For those without the necessary background courses in undergraduate science and mathematics (particularly geology), additional coursework must be completed prior to the start of the graduate student program. Students will be advised of the additional requirements upon admission.

All persons who wish to enroll in the Graduate Certificate in Environmental Geology must complete an application online at www.graduate.ku.edu/apply and submit the required fees.

Persons who are not already enrolled as KU graduate students must submit the following materials:

a. A Statement of Interest in the Environmental Geology Program. This 1-2 page narrative should summarize your education, employment history, your long-term career goals, and how this certificate will help you achieve these goals.

b. Official undergraduate transcript;

c. A letter of recommendation from a person familiar with your academic work or qualified to offer judgment on your ability to undertake graduate-level work (former professor of instructor, workplace supervisor, etc).

Current KU graduate students must be in good standing with their graduate degree program in order to apply and participate in the certificate program. Current students must submit the following materials to apply:

a. A Statement of Interest in the Environmental Geology Program and its relationship to your graduate course of study. This 1-2 page narrative should summarize your education, employment history, your long-term career goals, and how this certificate will help you achieve these goals.

b. An unofficial copy of your KU transcript;

c. A letter of support from your graduate degree program (your advisor or graduate director).

Awarding of certificates will be handled consistent with guidelines and timing for degree conferral as established by the Office of the Registrar. For more information on requirements for admission to a graduate certificate program at KU, see the policy on Admission to Graduate Study.

Degree Requirements

Students must complete 5 courses for a total of 14 graduate credit hours:

**EVRN 721** Environmental Regulation and Policy 3

**GEOL 751** Physical Hydrogeology (Students with no previous hydrology courses must take GEOL 552. Introduction to Hydrogeology prior to taking this course; GEOL 552 will not count toward graduate elective credits for the environmental geology degree or certificate.)

**GEOL 753** Chemical and Microbial Hydrogeology 4

**GEOL 755** Site Assessment and Remediation 3

Select 1 of the following field methods courses:
Faculty Profile

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<tr>
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<tr>
<td>Program Director - TBD (See Additional Information section for more details).</td>
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<td>David Fowle, Professor, Geology</td>
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<td>Randy Stotler, Assistant Professor, Geology</td>
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Student Profile

Anticipated student enrollment

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Anticipated number of program graduates

| After 5 Years | 12 |
| After 7 Years | 15 |

Academic Support

None.

Facilities and Equipment

No additional facilities and equipment required. The program will share lab space in the KU-Edwards Regents Center with the Environmental Soils Laboratory.

Program Review, Assessment, Accreditation

Since the curriculum of the proposed certificate substantially parallels the graduate science element of the proposed Professional Science Masters in Environmental Geology, the PSM-EG External Advisory Board will be tasked with oversight of the Environmental Geology Graduate certificate as well. The PSM EAB assists with clarifying program objectives, identifying expected learning and professional development outcomes, and ensuring that regional workforce needs are met. Members of the PSM-EG EAB are recruited from professionals at private firms, public agencies, and nonprofits in the Greater Kansas City metro area, and meets annually.

The College and Graduate Studies will evaluate the certificate program every 7 years as part of the mandatory review and renewal process for all graduate certificates.

Costs, Financing

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What is the source of the new funds?

This program requires no additional funds. Courses for the certificate will be taught under the proposed Professional Science Masters in Environmental Geology.

Rationale for proposal

The proposed Graduate Certificate in Environmental Geology will be complementary to the proposed Professional Science Masters in Environmental Geology. This certificate can be completed as a stand-alone graduate certificate; as a graduate certificate paired with an appropriate graduate degree that the student is simultaneously enrolled in; or as a precursor to starting the full PSM-EG program.

Additional Information

A Program Director or Coordinator, based at the KU Edwards Campus, will be hired to support and teach for the certificate and the PSM programs. See the GEO-PSM proposal for more details.
Note on distribution of budget: We are anticipating $80,000 for the program director, and $30,000 for other faculty, including regular faculty, adjuncts, etc. However, exact distributions of the $110,000 budgeted for salaries will depend in part on what the market rate will be for a professor-of-practice or an academic program associate/lecturer to serve as program director, which faculty in Geology would teach over at Edwards.

<table>
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<tr>
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<td>Appendix_3 PSM-EG advisory group.pdf</td>
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**Program Reviewer Comments**

- **Kristine Latta (klatta) (02/07/17 12:23 pm):** Approved by Dean Lejuez on 2/1
- **Kristine Latta (klatta) (04/11/17 8:58 am):** Changed note regarding GEOL 751 prerequisites. Added note about distribution of budget.
# Program Change Request

## New Program Proposal

Date Submitted: 11/28/16 2:00 pm

**Viewing:** LA&S-CONC : Environmental Geology, P.S.M.

**Last edit:** 04/10/17 2:42 pm

Changes proposed by: jakubaus

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**Program Name**

Environmental Geology, P.S.M.

**Location(s) of Instruction**

Edwards

Do you intend for this program to be offered online?  
No

**Effective Catalog**

2018 - 2019

In Workflow

A. CLAS Dean or Associate Dean  
B. Provost's Office  
C. COGA Director  
D. CGS PAS Subcommittee Chair  
E. CGS Committee  
F. CAC  
G. Graduate Studies  
H. OIRP CIP Approval  
I. Provost's Office  
J. Future Academic Catalog

**Approval Path**

A. 02/07/17 12:25 pm  
Kristine Latta (klatta):  
Approved for CLAS Dean or Associate Dean

B. 02/13/17 11:11 am  
Aileen Ball (aball):  
Approved for Provost's Office

C. 02/21/17 8:40 am  
Kristine Latta (klatta):  
Rollback to Provost's Office for COGA Director

D. 03/08/17 2:02 pm  
Aileen Ball (aball):  
Approved for Provost's Office

E. 04/10/17 2:42 pm  
Kristine Latta (klatta):  
Approved for COGA Director

F. 04/11/17 8:59 pm

LA&S-CONC: Environmental Geology, P.S.M.
Program Description

The Department of Geology proposes to add a new concentration, Environmental Geology, within the existing Professional Science Masters (PSM) in Applied Science at the KU Edwards Campus in Overland Park (PSM-EG).

Environmental geology is an interdisciplinary field that seeks to address and study anthropogenically-derived and naturally occurring environmental hazards on Earth. The field is grounded in basic geological sub-disciplines such as mineralogy, sedimentology and stratigraphy but has primary focus on hydrogeology, geochemistry, geophysics and components of engineering geology. These sub-disciplines and the associated field and laboratory techniques in the form of a PSM program lead to an applied understanding of how to utilize geophysical, geochemical and hydrogeological techniques to evaluate, remediate, and monitor the impact or potential impact of contamination. This applied program separates itself from traditional thesis-based research MS degrees in Geology and/or Hydrogeology through its direct integration of management, communication and case study based coursework with a focus of developing future government and industry professional leaders in Environmental Geology with a broad toolbox to address environmental problems.

The curriculum for the PSM-EG builds upon the PSM template created by KU in 2012-2013; best practices as recommended by the National Professional Science Masters Association (NPSMA); and the recommendations of an external advisory board of twelve Kansas City area environmental geologists and professional geologists convened at the KU Edwards Campus in March 2016 (See Appendix 3 for a list of the members of this panel).

Demand/Need for the Program

This professional applied science degree will directly respond to workforce needs in the Greater Kansas City metro area for environmental professionals with graduate training in this subject. The environmental services industry, exemplified in the Kansas City metro area by such major companies as Black&Veatch, Burns & McDonnell, Bartlett&West, and numerous other companies, is a growing sector for employment for geology graduates, eclipsing the oil&gas industry for the first time in 2014 (Appendix 1).

The Professional Science Master’s (PSM) is a relatively new interdisciplinary graduate degree that combines advanced coursework in science with a set of professional skills courses (project management, technical writing/communications, financial management), and a capstone/ internship experience. All PSM degree programs establish an External Advisory Board from professionals in the subject area to assist with clarifying program objectives, identifying expected learning and professional development outcomes, and ensuring that regional workforce needs are met.

The Council of Graduate Studies reports that the bulk of new jobs being created are in the non-academic sector, and master’s graduates are more likely to be employed in the state in which they earned a degree compared to Ph.D. graduates. Furthermore, PSM graduates contribute to workforce development through their ability to manage and grow science & technology based industries.

Job outlook:

Data from the American Geosciences Institute Geoscience Student Exit Survey conducted for the 2014-2015 academic year indicated that for the first time, environmental services hired more geoscience graduates than the oil and gas industry (Appendix 1). The survey notes: “For the first time since AGI began the Geoscience Student Exit Survey, an industry other than oil and gas, hired the most bachelor’s graduates. Anecdotal discussions have focused on the increasing job market within the environmental services industry, and this year’s data supports the viability of this industry for geoscience graduates.” [Geoscience Currents # 108].

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environmental agencies/companies offers several strong advantages for the proposed PSM-EG program: first, a large latent pool of students for the program; second, numerous opportunities in these companies and agencies for internships for our PSM-EG students; and third, a pool of environmental professionals to draw upon for lecturers/professors-of-practice for our courses and for our External Advisory Board. We have already drawn upon professional geologists in the metro area for a focus group to define the need for and the ideal structure/content for an applied environmental geology PSM (see Appendix 3 for the member of this group).

The proposed PSM in Environmental Geology will be without peer in the local region. There is no specific competition for such a program within 500 miles of the Edwards Campus. All other programs consist of traditional thesis or non-thesis MS programs that do not address the professional development of the students beyond their expertise. Our focus group of industry and government professionals (Appendix 3) were direct in their assessment that there is a dearth of the types of students this program will generate in the greater Kansas City metropolitan area and beyond. There was agreement that this would put KU at the front of an emerging market and that there was a clear need for a program that was focused, whose curriculum was driven both by pedagogy and industry input, and whose graduates would not require significant additional training upon their hiring. The proposed KU program will also distinguish itself from peers further afield by having a faculty invested directly into the leadership and direction of the program rather than the more typical collection of classes to develop a professional degree. Finally, our focus group was very excited by the prospect of ongoing professional development opportunities for their currently employed environmental professionals are required to have continuing education as part of their licensure providing on going enrollment opportunities for the program.

Other programs in state/region:

University of Kansas-Lawrence Campus: Master of Science degree in geology (Traditional thesis-based graduate degree and non-thesis option).

University of Missouri-Kansas City: Master of Science degree in environmental and urban geosciences (Traditional thesis-based graduate degree).

Emporia State University: Master of Science degree in Physical Sciences with earth science concentration (Traditional thesis-based graduate degree).

University of Kansas-Lawrence Campus: Master of Science degree in geology

The PSM in Environmental Geology differs from existing non-thesis masters in Geology in three ways: Recognizing that many businesses seek people who are not only knowledgeable in the field's latest developments, but have management skills as well, it explicitly incorporates professional skills courses in project management, finance, and organizational management; the curriculum is designed in collaboration with an external advisory board of geology professionals to focus on environmental geology; and it incorporates an applied capstone project, ideally developed in collaboration with a private company or public agency.

**Admission Requirements**

The admissions requirements for the Professional Science Master's in Applied Science with a concentration in Environmental Geology include:

A. Bachelor’s degree from an accredited institution; The student must have an undergraduate major in geology, or in the natural, physical, or applied sciences, engineering, or related fields. Coursework should include chemistry, biology, physics, and math. For those without the necessary background courses in undergraduate geology, science, and mathematics, additional coursework will need to be completed prior to the start of the graduate student program. Students will be advised of these additional requirements upon admission.

B. A grade-point average of B (3.0 on a 4.0 scale) for all previous university work is required. Under extenuating circumstances an applicant with an average below 3.0 may be considered for provisional admission (see additional requirement for GPA below 3.0 in next item). International students may not be admitted provisionally.

C. Graduate Record Examination (GRE) scores: For students with an undergraduate cumulative GPA of 3.0 or greater, the GRE is recommended, but not required. For those with less than a 3.0 seeking provisional admission, the GRE is required. GRE scores must be within the last 5 years.

D. Statement of interest: This 1-2 page narrative should succinctly summarize your education, employment history, your long-term career goals, and how this program will help you achieve these goals.

E. At least two letters of recommendation from persons qualified to offer judgment on your ability to undertake graduate-level work.

For more information on requirements for admission to a graduate certificate program at KU, see the policy on Admission to Graduate Study. Applications may be submitted at [www.graduate.ku.edu/apply](http://www.graduate.ku.edu/apply).
GEOL 854 Field and Laboratory Methods: Geobiology 1
GEOL 855 Field and Laboratory Methods: Environmental Geophysics (Course in development) 1
Geology 856 Field and Laboratory Methods: Special Topics (Course in development) 1

Other Electives (Choose at least 6 credit hours)
GEOL 536 Geological Log Analysis 1
GEOL 577 Environmental Geophysics 3
GEOL 715 Geochemistry 3
GEOL 791 Advanced Topics in Geology: _____ 1-5
EVRN 730 Environmental Toxicology 3
EVRN 740 Soil Science for Environmental Assessment 3
EVRN 745 Environmental Data Analysis and Statistics 3

Or other elective chosen in consultation with an advisor

Capstone Requirement
GEOL 815 Professional Science Masters in Environmental Geology Captstone (Course in development) 3

### Faculty Profile

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<th>Number of Faculty FTE</th>
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<td>Program Director (TBD - See Additional Support section for more information)</td>
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### Student Profile

#### Anticipated student enrollment

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<th>Year</th>
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#### Anticipated number of program graduates

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### Academic Support

Program Staff: A PSM-EG director or coordinator will be hired in Year 1. This person, based at the KU Edwards Campus, will direct the program, work with the external advisory board, and develop and implement a marketing and recruitment plan in collaboration with Edwards staff. Additionally, the PSM-EA director will teach GEOL 7xx__: Site Assessment and Remediation; two sections of GEOL 851: Field and Laboratory Methods; and will offer GEOL 815, the PSM-EG Capstone every semester with the exception of Year 1.

Graduate advising, course selection, and recruitment/marketing will be supported by the KU Edwards Graduate Advisor. This person currently provides support to the PSM-Environmental Assessment, the graduate certificates in environmental assessment, environmental justice, and science management, and will add the PSM-Environmental Geology degree, certificate, and 4+1 to their portfolio.

No new physical space or library resources are required for the successful implementation and administration of the new program. The teaching and office space will be accommodated in the Business, Engineering, Science and Technology (BEST) building on the Edwards Campus.

### Facilities and Equipment

The program will share lab space in the KU-Edwards Regents Center with the Environmental Soils Laboratory. Pedagogy for the program would be improved through the development of a lab capable of basic wet chemistry, field preparation and microbiology. The program could separate itself from all competition throughout the US by developing an on-campus series of hydrogeology monitoring wells (perhaps developed with students over the course of several years and subsidized through offers of collaboration and drilling from our focus group partners). These wells and associated instrumentation could become an excellent experiential learning focal point for the program and provide the opportunity for leading edge experiences for the PSM students and the development of topical short courses for current industry and government professionals.

### Program Review, Assessment, Accreditation

In addition to regular mandated University review, the program will have an External Advisory Board (EAB) to provide review and oversight. In March 2016, an ad-hoc committee of 12 environmental and professional geologists from companies and agencies in the Kansas City metro area met with KU staff to discuss the ideal curriculum for a PSM in Environmental Geology (See Appendix 3 for a list of this members of this panel). It is likely that many of the members of this early group will form the nucleus of a more formal External Advisory Board for the PSM-EG. The PSM program will also affiliate...
with the PSM Initiative of the Council of Graduate Schools, which provides guidelines on best practices for PSMs and reviews affiliated programs every four years.

**Costs, Financing**

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What is the source of the new funds?
Funding for the faculty and OOE will be from the 0.125 cent sales tax in Johnson County, KS (JCERT, Johnson County Education and Research Triangle) funds.

**Rationale for proposal**
KU has a unique opportunity to leverage our existing assets in the form of a strong geology program, the Professional Science Masters in Applied Science, and the JCERT funding of the KU Edwards Campus to respond to a professional workforce need in the form of numerous environmental companies and agencies in the Kansas City metro area.

**Additional Information**
Proposals for two related programs are also under review or in development: 1) Graduate Certificate in Environmental Geology and a 4+1 Accelerated Bachelors in Geology-Professional Science Masters in Environmental Geology.

**Supporting Documents**
- Appendix 2 EMSI Reports.pdf
- Appendix 3 PSM-EG advisory group.pdf
- EVRN Support PSM Env Geology.pdf
- LOS_Geology PSM.pdf

**Program Reviewer Comments**
- **Kristine Latta (klatta) (12/06/16 2:17 pm):** Changed proposing department to LA&S. Changed from "concentration" to degree, though this is to be a concentration within the existing PSM degree. Both of these per Kim O'Bryon's instructions to ensure this is understood as a concentration within the existing LA&S PSM degree.

- **Kristine Latta (klatta) (12/21/16 3:49 pm):** Uploaded letters of support from EVRN and GEOL chairs.

- **Kristine Latta (klatta) (02/07/17 12:24 pm):** Approved by Dean Lejuez on 2/1.

- **Kristine Latta (klatta) (02/07/17 12:25 pm):** Submitted as a concentration within the PSM degree. Primary departmental home will be Geology.

- **Kristine Latta (klatta) (02/21/17 8:40 am):** Rollback: Aileen requested return.

- **Kristine Latta (klatta) (04/10/17 2:42 pm):** Updated FTE in faculty profile to correct typo.