University of Kansas
Professional Science Masters in Environmental Geology

Program Approval

I. General Information

A. Institution University of Kansas

B. Program Identification

Degree Level:	Masters
Program Title:	Professional Science Masters in Environmental Geology
Degree to be Offered:	Professional Science Masters
Responsible Department or Unit:	Geology
CIP Code:	40.0601
Modality:	Hybrid: (33 hours online; 3 hours face-to-face)
Proposed Implementation Date:	Spring 2025

Total Number of Semester Credit Hours for the Degree: 36

II. Clinical Sites: Does this program require the use of Clinical Sites? No.

III. Justification

KU offers a Professional Science Masters (PSM) degree in Applied Science. The PSM degree offers concentrations in environmental geology and environmental assessment. Since its inception in 2019, the environmental geology concentration has been very successful, with more than 80 enrolled students and more than 2500 inquiries. To-date, twenty students have graduated from the environmental geology concentration. To better align with workforce and professional licensure expectations of a titled degree in geology, and to more accurately reflect the program curriculum, this proposal seeks to elevate the existing environmental geology concentration to a major. This change would allow for more focused program marketing and enable greater career advancement of its graduates.

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 (Schulmeister, 2024a). 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.

IV. Program Demand:

B. Market Analysis

The demand for geoscience graduates with credentials beyond the traditional B.S. degree is high and is projected to grow. The American Geoscience Institute projects an increase in the number of Geoscience jobs to grow nationally by 4.9% between 2019 and 2029 (AGI, 2020). Within the geoscience field, environmental

geoscience is listed as one of the top three subdisciplines with an even higher projected growth of 9.2 % (AGI, 2020).

During the last decade, the number of undergraduate geology majors at the University of Kansas who have chosen the Environmental Geology concentration for the PSM degree has increased to 19% in the most recent three years, from 7.5 % in previous years (KU Analytics and Institutional Research, 2024). GEOL 552 Introduction to Hydrogeology is an upper-level, KU undergraduate, elective course that is perceived by most students, faculty, and employers as essential for a successful career in Environmental Geology. It is commonly taken by students who plan to seek employment in the field of environmental geology. Historic records of KU student enrollment demonstrate an upward trend in the number of students in GEOL 552 since reporting began in 1994. A sustained increase in the number of students enrolled in GEOL 552 since the 1990s suggests a sustained and growing interest in environmental careers by KU students.

The number of PSM degree programs has increased from 200 to more than 360 over the past 20 years (Tobias and Strausbaugh, 2018). KU's Environmental Geology PSM program is the only such program in the state of Kanas and one of only a few geology PSM programs in the U.S. It is also the only Environmental Geology program that can be completed primarily online (NSPMA, 2020; Schulmeister, 2024b,c) in the U.S. There are no PSM programs in environmental geology offered in surrounding states. Although peer PSM environmental geology programs are not available for comparison, the national number of geology majors choosing employment in the environmental sector continues to follow an upward trend established in the 1980s (AGI, 2019).

KBOR's Program Inventory indicates K-State and FHSU offer a master's degree with the same CIP Code at the master's level; however, none are offered through distance learning and KU's program is the only one that offers the CIP content as part of a Professional Science Masters degree:

V. Projected Enrollment for the Initial Three Years of the Program

Year	Total Headcount Per Year		Total Sem Credit Hrs Per Year	
	Full- Time	Part- Time	Full- Time	Part- Time
Implementation	2	28	36	392
Year 2	2	38	36	532
Year 3	2	48	36	672

VI. Employment

Based on workforce summaries compiled by the American Geological Institute, geologists are currently securing employment in three broad sectors: Environmental remediation and management, natural resource discovery and utilization, engineering and construction (AGI, 2019). Forty-eight percent of employed geoscientists work in the fields of environmental geology and hydrogeology (AGI, 2019).

KU cross-walked the CIP Code to the U.S. Bureau of Labor Statistics Standard Occupational Classification (SOC) Code and then reviewed employment projections from the Kansas Department of Labor. Kansas Department of Labor data show strong long-term occupational projections for the region. The PSM in environmental geology program's advisory board includes environmental managers and directors at State of Kansas agencies who have witnessed a shortage of qualified environmental geologists. State environmental agencies routinely solicit KU PSM program graduates for employment, and have sought KU's contribution to building a stronger workforce as part of its annual Environmental Conference (e.g. Schulmeister, 2021).

All students who have graduated from KU with a PSM degree with concentration in Environmental Geology have found employment in the environmental sector or have advanced in their existing environmental careers.

Most are working in State and Federal environmental agencies, environment consulting firms, and oil and gas companies. One graduate has developed an environmental science curriculum at the adult alternative high school where she is employed.

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 and Veatch, Bartlett and West, Wilson and Company, URS Engineering, AquaTerra Environmental Services, Terracon Engineering, Burns and McDonnell, Ecology and Environment Inc., and Marshall Miller & Associates), state and local environmental agencies (Johnson County Environmental Department, Kansas Department of Health and Environment, Kansas Department of Wildlife, Parks, and Tourism), and nongovernmental organizations (e.g., MidAmerica Regional Council). This concentration of environmental agencies/companies offers several strong advantages for students completing the environmental geology program: first, a large latent pool of students for the program; second, numerous opportunities in these companies and agencies for internships for 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.

VII. Admission and Curriculum

A. Admission Criteria

1. A Bachelor's degree from an accredited institution as evidenced by an official undergraduate transcript is required. Applicants should have an undergraduate degree in geology. Those with a related degree and 20 semester hours of geoscience coursework in geology, physical geography, engineering, or hydrology may be eligible. In some instances, relevant work experience in environmental geology may substitute for missing courses.

2. A grade-point average of B (3.0 on a 4.0 scale) for all previous university work is required. Under extenuating circumstances an average below 3.0 can be considered for provisional admission.

B. Curriculum

Year 1: Fall **SCH = Semester Credit Hours**

Course #	Course Name	SCH
GEOL 755	Site Assessment	3
GEOL 751	Physical Hydrogeology	3
PFS 801	Interpersonal & Persuasive Communication	3

Year 1: Spring

Course #	Course Name	SCH
GEOL 753	Chemical Hydrogeology	3
PFS 802	Managing Teams & Leading People	3
	Elective	3

Year 2: Summer

Course #	Course Name	SCH
GEOL 556	Field Methods in Hydrology *	3

Year 2: Fall

Course #	Course Name	SCH
EVRN 721	Env Regulation & Policy	3

PFS 803	Financial Management	3
GEOL 814	Capstone Experience 1	1

Year 2: Spring

Course #	Course Name	SCH
PFS 804	Project Management for Professionals	3
GEOL 815	Capstone Experience II	2
	Elective	3

* GEOL 556 may be replaced by 3, 1-cr-hr workshop courses during spring and fall semesters.

Total Number of Semester Credit Hours ……. [36]

VIII. Core Faculty

Faculty Name	Rank	Highest Degree	Tenure Track Y/N	Academic Area of Specialization	FTE to Proposed Program
*Marcia Schulmeister	Director and Teaching Professor	Ph.D.	N	Hydrogeology and geochemistry	1.0
TBD	Asst. Director and Asst. Teaching Professor	M.S. or higher	N	Environmental geology	1.0
Rick Devlin	Professor	Ph.D.	Y	Contaminant Hydrogeology	.25
Mary Hill	Professor	Ph.D.	Y	Groundwater modeling	.25
Rick Leines	Adjunct Instructor	B.S.	N	Haz Waste Operations	0.125
Clark Rein	Adjunct Instructor	M.S.	N	Site Assessment	0.125
Sarah Webb	Lecturer	M.A.	N	Strategic Communication	0.125
Jordan Atkinson	Professor of Practice	Ph.D.	N	Communication Studies	0.125
Jacque Eidson	Lecturer	Ph.D.	N	Organizational Psychology	0.125
Karina Addari	Lecturer	Ph.D.	N	Supply Chain Management	0.125

Number of graduate assistants assigned to this program ……. **[0]**

IX. Expenditure and Funding Sources

A. EXPENDITURES	First FY	Second FY	Third FY
Personnel – Reassigned or Existing Positions			

Faculty	164,140	168,245	172,450
Administrators *(other than instruction time)*	120,000	123,000	126,075
Graduate Assistants	0	0	0
Support Staff for Administration (*e.g., secretarial*)	0	0	0
Fringe Benefits *(total for all groups).. costrate*	75,970	76,970	77,970
Other Personnel Costs	0	0	0
Total Existing Personnel Costs – Reassigned or Existing	**360,110**	**368,215**	**376,495**
Personnel – New Positions			
Faculty	0	0	0
Administrators	25,500	26,138	26,791
Graduate Assistants	0	0	0
Support Staff for Administration (*e.g., secretarial*)	0	0	0
Fringe Benefits *(total for all groups)*	5,100	5,228	5,358
Other Personnel Costs	0	0	0
Total Existing Personnel Costs – New Positions	**30,600**	**31,366**	**32,149**
Start-up Costs - One-Time Expenses			
Library/learning resources	0	0	0
Equipment/Technology	0	0	0
Physical Facilities:Construction or Renovation	0	0	0
Other	0	0	0
Total Start-up Costs	0	0	0
Operating Costs – Recurring Expenses			
Supplies/Expenses	0	0	0
Library/learning resources, marketing	0	0	0
Equipment/Technology	5,205	5,205	5,205
Travel	2,400	2,400	2,400
Other	1,400	1,400	1,400
Total Operating Costs	**9,005**	**9,005**	**9,005**
GRAND TOTAL COSTS	**399,715**	**408,586**	**417,649**

B. FUNDING SOURCE *(projected as appropriate)*	Current	First FY (New)	Second FY (New)	Third FY (New)
Tuition / State Funds		233,260	309,560	385,860
Student Fees		0	0	0
Other Sources (JCERT tax revenue)		341,171	348,905	356,807

GRAND TOTAL FUNDING		**574,431**	**658,465**	**742,667**
C. Projected Surplus/Deficit (+/-) (Grand Total Funding *minus* Grand Total Costs)		174,716	249,879	325,018

X. Expenditures and Funding Sources Explanations

A. Expenditures
Personnel – Reassigned or Existing Positions

Two core Geology faculty members are currently teaching required Geology courses in the program. Additional faculty members in the Department of Geology contribute elective courses that may be counted toward the degree. Faculty in the School of Professional Studies teach the PFS courses and the PFS courses fulfill requirements for multiple graduate degrees.

Personnel – New Positions

A half-time Graduate Program Coordinator will be hired to support student advising.

Start-up Costs – One-Time Expenses

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.

The program will share lab space at the Edwards Campus with the Environmental Soils Laboratory.

Operating Costs – Recurring Expenses

Laboratory and field equipment will be purchased to support student exercises and demonstrations annually. Operating costs will include sample analysis and expendable supplies.

B. Revenue: Funding Sources

Tuition rate is all inclusive = $545/cr. hr

Year	Total Headcount Per Year		Total Sem Credit Hrs Per Year		Income
	Full- Time	Part- Time	Full- Time	Part- Time	
Implementation	2	28	36	392	233,260
Year 2	2	38	36	532	309,560
Year 3	2	48	36	672	385,860

C. Projected Surplus/Deficit

Program revenues are expected to exceed expenditures the first year of operation.

XI. References

American Geological Institute (2019) Geoscience Workforce Changes 2018-2028- Geoscience Workforce Projected to Grow by 6.2%, Geoscience Currents**,** Data Brief 2019-010.

Schulmeister, M.K. (2021) Building Interest in Environmental Careers, Kansas Department of Health and Environment, Environmental Conference, Manhattan, KS, Aug., 2021 (I**NVITED**)

Schulmeister, M.K. (2024a) Advancing the Science and Management of Contaminated Groundwater Investigations through the University of Kansas Professional Science Master's Programs, *International Groundwater Congress*, Davos, Switzerland, Sept 13, 2024. (**INVITED**)

Schulmeister, M.K. (2024b) In my experience: Online Geoscience has a Role to Play: *Groundwater Monitoring and Remediation*, 44 (1) 133-135, https://doi.org/10.1111/gwmr.12631 (**INVITED**)

Schulmeister, M.K., (2024c) Exploring Online Learning in Geoscience Education: Challenges, Opportunities and Future Directions, *Geological Society of America Abstracts with Programs*, Vol. 56, No. 6, Anaheim, CA, October, 12, 2024 (**INVITED**)

Tobias, S. and Strausbaugh. L. (2018) The Professional Science Master's Degree at Twenty. *Journal of College Science Teaching* Vol. 47, No. 42.