

### **Program Review**

Self-Study Template

Revised 11-15-2021

Academic unit:Geology	College:LAS
Date of last review2018	Date of last accreditation report (if relevant)NA
List all degrees described in this report (a	dd lines as necessary)
Degree: BS Geology	CIP* code: 40.0601
Degree: MS EEPS	CIP code: 40.0601
Degree:	CIP* code:
Degree:	CIP* code:
*To look up, go to: Classification of Instructional Program	ms Website, http://nces.ed.gov/ipeds/cipcode/Default.aspx?v=55

Certificate (s): \_\_Certificate in Environment and Sustainability (est. fall 2020) \_

Faculty of the academic unit (add lines as necessary)

(If interdisciplinary, please list your core teaching faculty and department name if external to academic unit)

NAME (List department –if external to unit)	SIGNATURE	TENURE OR NON- TENURE TRACK
Dr. Bill Bischoff	Www. Brocht	Tenured
Dr. Collette Burke	ensaule	Tenured
Dr. Zelalem Demissie	Anglaten	Tenure-track
Dr. Will Parcell	AFCR	Tenured
Dr. Andrew Swindle	ang-	Tenured
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Submitted by: Millihm C. Parcell, Chair Date 4/01/22 (Name and title) Date 4/01/22

In yellow highlighted areas, data will be provided



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Degree:	CIP*	code:
Degree:	CIP*	code:
*To look up, go to: Classification of Instructional Programs Website, $\underline{htt}$	://nces.ed.gov/ipeds/cipcode/Defaul	t.aspx?y=55

Certificate (s): \_\_\_\_\_

Faculty of the academic unit (add lines as necessary)

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Dr. Will Parcell		Tenured
Dr. Andrew Swindle		Tenured

Submitted by: \_\_\_\_\_

(Name and title)

Date \_\_\_

(Date)

In yellow highlighted areas, data will be provided

### Part 1: Departmental Purpose, Relationship to the University Mission and Strategic Plan engagement

*Please list the program purpose statement. Explain in 1-2 concise paragraphs the role of the program and tie them to the University mission (printed below) and strategic plan.* 

The mission of Wichita State University is to be an essential **educational, cultural and economic driver** for Kansas and the greater public good.

### A. Program Purpose Statement - formerly Mission

(If more than one program, list each purpose statement):

### **Geology BS Program**

The purpose of the Department of Geology program is to prepare students with the scientific knowledge to proceed to geologic careers in industry, government, or to be admitted to a geology graduate program. Students are prepared for certification/registration on a state, national, or international level where appropriate. Students are prepared with the background and skills to enable them to continue to learn, develop, and adapt their geoscience career to changing global economic and cultural situations.

### **EEPS MS Program**

The purpose of the EEPS Program is to train scientists, professionals, and educators who will be well equipped with general knowledge and skills in methodology, critical and creative thinking in scientific research, and advanced knowledge and skills in geology, environmental science, or physics.

### B. The role of the Program(s) and relationship to the University mission:

The degree programs offered through the Department of Geology include a Bachelor of Science in Geology and a Master of Science in EEPS which support the mission of the College of Liberal Arts and Sciences to "cultivate intellectual curiosity and foster contemplation of the human experience and the natural world," through teaching (1) a curriculum covering the theoretical and applied fields of geology and allied sciences, (2) supporting scholarly research, and (3) supporting professional service.

In similar ways, we support the mission of the University in (1) preparing students with the scientific knowledge expected for geologic careers in national or international industry, government, or academia, (2) training students in sustainable approaches to energy, water, and mineral resource exploration and management, and (3) continuing a long history of collaboration with and staffing of local petroleum and environmental companies.

C. Has the purpose of the Program(s) changed since last review?



If yes, describe in 1-2 concise paragraphs. If no, is there a need to change?

D. How does the Program support the university strategic plan?

### Describe in 1-2 concise paragraphs.

Geology degree programs include a Bachelor of Science in Geology and a Master of Science in EEPS which support the mission of the university's strategic plan to provide **student centered**, high-quality, <u>applied learning</u> experiences with an **inclusive** and welcoming **campus culture** that is increasingly diverse in faculty and students. Our programs drive <u>prosperity</u> for our constituents through (1) teaching a curriculum covering the theoretical and applied fields of geology and allied sciences to prepare students for the workforce in geologic careers in national or international industry, government, or academia, (2) supporting impactful **research and scholarship**, often in partnership with local industry and non-profits and (3) supporting local economy and industry by training students in areas of resource exploration,

management, and sustainability, (4) working through local, state, and national **partnerships and engagement** to offer students new applied learning and research opportunities as well as increased alumni and donor relationships.

### *E.* Provide an overall description of your program(s) including any changes made since the last review?

**Description of Undergraduate BS Geology Program:** The BS in Geology program is based on a traditional applied geoscience education format. There are no regional or national accreditation requirements for the program; however, for our graduates to work in the State of Kansas as licensed geologists, their undergraduate training must meet the state's registration licensing board criteria (in alignment with the Association of State Boards of Geology or ASBOG) and our students must take specific courses (table below) that indicate preparation in core areas of the geosciences. In effect, these requirements frame and standardize the undergraduate curriculum of our and other geology UG programs in the state. Our program has consistently shown close alignment with the licensing board's criteria for geology undergraduate programs and our students have been successful at being licensed in the State of Kansas and other states.

ASBOG CORE COURSES	WSU COURSES	ASBOG ELECTIVE OPTIONS	WSU COURSES
General Geology	GEOL 111/102*	Hydrogeology	GEOL 650
Structural Geology	GEOL 544*	Economic Geology	GEOL 300
Stratigraphy or Sedimentary Geology	GEOL 522*	Geophysics	GEOL 760
Mineralogy	GEOL 320*	Historical	GEOL 312*
Petrology	GEOL 324*	Geomorphology	GEOL 560
Field Geology	GEOL 640*	Engineering Geology	GEOL 690AP
		Geochemistry	GEOL 720
		Paleontology	GEOL 570*

### Kansas State Board of Technical Professions - Geology Curriculum vs WSU Courses

WSU BS Geology required courses marked with an \*

Therefore, the BS degree provides comprehensive training in geology and allied natural sciences, prepares graduates for applied professional work in industry or government, as well as for graduate study in any field of geoscience or environmental sciences. The BS curriculum requires a minimum of 45 hours in geology. In addition, students are required to complete Calculus I and II, Elementary Statistics, General and Inorganic Chemistry, and General College Physics I and II or University Physics I and II. The department recommends that students who expect to earn the BS in geology should enter the program with a strong background in geometry, trigonometry, algebra, and chemistry. The program goals include:

- Prepare individuals for employment in geologic careers in industry, government, or academia
- Foster professional growth and commitment to lifelong learning for students and faculty
- Support and encourage scholarly research in the geological sciences
- Ensure efficient and effective program operations consistent with the college, University and profession.

**Description of Masters EEPS Program**: The EEPS program offers students an opportunity for faculty-directed, multidisciplinary, graduate education and research to investigate Earth processes. It emphasizes knowledgeable development and utilization of our planet's resources and the consequences of human activity on the environment. The EEPS curriculum requires 30 – 36 hours in EEPS, Geology, Physics, or related disciplines. The department recommends that students entering the MS in EEPS should have completed college-level chemistry and physics on entering the program. To meet the requirements of differing career goals, students may choose a thesis, internship, or non-thesis option. The EEPS program is designed to:

- Prepare individuals for employment in applied environmental, geologic, and physics careers in industry, government, or academia
- Foster professional growth and commitment to lifelong learning for students and faculty
- Support and encourage independent scholarship and develop competence in research in the physical and environmental sciences

# Part 2: Faculty Quality and Productivity as a Factor of Program Quality

6 (Program Majors) and 7 (Degree Production) from OPA can be used to help with this section. and service. (Refer to instructions in the WSU Program Review Instructions for more information on completing this section. Tables 4 (Instructional FTE) The quality of the program/certificate as assessed by the strengths, productivity, and qualifications of the faculty in terms of scholarly/creative activity

×					-				
*Winning by compe	2020	2019	2018			тоцистки	Productivity	Scholarly	
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ction.	4	ω	2			Submitted	Awarded or	No. Grants	
	\$1,391,883	\$1,066,105	\$3,116,105				\$ Grant Value		

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Α Briefly explain the standards in place in your college/department for the evaluation of your faculty recorded and provide narrative related to productivity. research/scholarship/creative activity. If an interdisciplinary program, please report on the program where faculty research has been

and attempts to generate support for such in the faculty member's area of expertise and/or study. It also pertains to honors and awards received. Faculty productivity presentations at professional field trip guidebooks that are based on original research and which are published by reputable presses; (d) published, refereed abstracts, which usually accompany reporting the results of original research in refereed journals of regional or more restricted circulation, or in edited conference proceedings of limited circulation; (c) written as chapters in books edited by acknowledged experts in the field; and issued as books or monographs published by reputable presses), (b) full-paper publications reporting the results of original research (refereed journals that are recognized by the profession at-large as being of the highest caliber and of wide circulation; or as it pertains to research and scholarly activity is considered by annual evaluation of publications and research support. Publications include, (a) full paper publications For the Geology Department, the term "research and allied scholarly activity" pertains to activities that demonstrate a scope of original basic and/or applied research meetings; (e) textbooks published by reputable presses; (f) book reviews; (g) published, non-refereed abstracts; (h) scientific presentations that are not accompanied by published text; and (i) articles of scientific scope published for the refereed or edited popular press.

B. Provide a brief assessment of the quality of the faculty/staff using the data from the table above. Include details related to productivity of the faculty including scholarship/research and creative activity and services. (i.e., some departments may have a few faculty producing the majority of the scholarship, service, efforts to recruit/retain faculty, departmental succession plans, etc.)

The Geology Department has seen continued faculty changes during the assessment period (*Figure 1*). The department began 2018 with five full-time faculty, followed by a faculty resignation in fall 2018, a new tenure-track faculty hire in 2019, and a reassignment of late-career faculty member to our department in 2019 (who then subsequently retired in 2020). Through these changes, the department has continued to build a quality level of publication and research support activity. Currently, all tenure/tenure-track professors hold doctoral degrees and department instructors hold either



doctorate or masters degrees. Our faculty consistently excel in attaining **industry awards and gifts**. Between 2017 and 2019 the Geology Department was awarded over \$5.5 million. In 2018, the full-time department faculty produced three peer-reviewed publications, one abstract in conference proceedings, and \$3,116,105 in grants and industry awards. In 2019, the department faculty produced four peer-reviewed publications, four abstracts at conference proceedings and \$1,066,105 in grants and industry awards. In 2020, the faculty produced five peer-reviewed publications, eight abstracts at conference proceedings, and \$1,391,883 in grants and industry awards.

Figure 1: Number of instructional FTE employed in Geology Department

### Part 3: Academic Program(s) and Emphases

Analyze the quality of the program as assessed by its curriculum and impact on students for each program (if more than one). Attach updated program assessment plan(s) as an appendix (refer to instructions in the WSU Program Review document for more information).

- A. Undergraduate programs:

If yes, please explain the average ACT scores for your students.



The Geology undergraduate students have ranked higher in ACT scores than the KBOR minimum, and above university average, excepting 2018 (*Figure 2*). We have no supporting data to explain the sudden drop and then sudden rise in 2019.

Figure 2: Average ACT scores for Geology Junior and Seniors

- B. Graduate programs:
- 1. Please review Table 9 provided by the Office of Planning and Analysis. Is the program GPA below the university average? X Yes No



If yes, please explain the average GPA of your graduate students.

The GPAs of incoming graduate students in the EEPS program continue to rank above 3.0 but have been moving lower since 2013 (*Figure 3*). A reduction in employment opportunities in the oil/gas sector has resulted in a decline in applications to both graduate and undergraduate geology programs. As a result, the department has shifted its recruitment strategy to maintain KBOR minimum enrollment numbers by (1) being less academically selective and (2) increasing the underrepresented minorities (URM) in the program.

Figure 3: Comparison of EEPS GPAs to university graduate GPAs with relationship to URM enrolled

C. Accreditation status: If accreditation is previously noted, please add:

NOT APPLICABLE

# D. Assessment of Learning Outcomes

1. Complete the table below with program level data. Identify the principal learning outcomes (i.e., with what skills does your Program expect students to graduate) and provide aggregate data on how students are meeting those outcomes

complete the table below.) append the information from the accreditation document to this self-study and cite, with page number, the appropriate information. If specialty accreditation has not been affirmed within 18 months, please complete the table or submit an updated version of your accreditation information. If not accredited, please You may add an appendix to provide more explanation/details. (If specialty accreditation has been conferred within 18 months of this process, programs can

Learning Outcomes (most programs will have multiple outcomes)	Assessment Type (e.g., portfolios, exams)	Assessment Tool (e.g. rubrics, grading scale)	Target/Criteria (desired program level achievement)	Results	Analysis
Students will have a basic understanding of human anatomy:	Comprehensive Exam	Rubric	80% of students will score 80% Or <	90% of students scored 80% or better:	Proficient knowledge of anatomy has been demonstrated.
Geology majors will demonstrate skills in integrating sedimentary/paleontology, igneous	OPTION 1: Measured through lab project in GEOL 324 "Petrology"	Grading scale that assesses mastery of sedimentary,	Target is a 90% passing assignments;	2018: 100% passed project, n= 8	Students are performing at a high level on this learning
and metamorphic rocks.		paleontology, igneous and	minimum 70% passing	2019: 100% passed project	outcome.
		metamorphic rocks.	assignments	n = 8	
				2020: 100% passed project	
				n = 6	
	OPTION 2: Measured through Comprehensive final exam in GEOL 570 "Biogeology"	Grading scale that assesses mastery of fossils and biogeology.	Target is a 90% passing assignments; minimum 70%	2018: Data not collected	see above
			passing assignments	2019: Data not collected	
				2020: Data not collected	

Geology majors will demonstrate ability to investigate theory and application of the hydrologic cycle, physical, and chemical properties of water.	Geology majors will demonstrate skills in application of mapping to solve geologic problems.
Measured through Geologic	Measured through Map and
report in GEOL 650	geologic report in Geol 640
"Hydrogeology"	"Field Geology"
Grading scale that assesses mastery of understanding hydrologic cycle, physical, and chemical properties of water	Rubric that assesses mastery of bedrock mapping and communicating resulting geologic relationships
Target is a 90%	Target is a 90%
passing	meet rubric
assignment;	criteria;
minimum 70%	minimum 70%
passing	meet rubric
assignments	criteria
2018: 100% passed project n = 5 2019: 100% passed project n = 4 2020: 100% passed project n = 4	2018: 2018: 100% met rubric criteria, n=20 2019: 100% met rubric criteria n = 19 2020: 100% met rubric criteria n = 13
Students are	Students are
performing at a high	performing at a high
level on this learning	level on this learning
outcome.	outcome.

outcome.	2019: 92% passed project; n=5	passing assignment	environments and resource problems at	Global Env. Science	
performing at a high	n=5	passing assignment; minimum 70%	understanding of Farth's physical	through Portfolio (geologic report) in FFPS	
Students are	2018: 87% passed project;	Target is a 90%	Rubric that assesses	<b>OPTION 2: Measured</b>	scales.
	Data not collected				resource problems at different spatial and temporal
	2020:		different spatial and		understanding of Earth's
	Data not collected		resource problems at	Science	to demonstrate
	2019:	passing report	Earth's physical	710: Great Discoveries	techniques associated with
See below	2018: Data not collected	Target is a 90% passing assignment; minimum 70%	Grading scale that assesses mastery of understanding of	OPTION 1: Measured through Portfolio (geologic report) in EEPS	EEPS majors will demonstrate ability to evaluate multidisciplinary scientific
	2020: Data not collected			Science	
	2019: Data not collected	passing assignment	and earth resources	Global Environmental	
see above	2018: Data not collected	Target is a 90% passing assignment; minimum 70%	Grading scale that assesses knowledge in	OPTION 2: Measured through Portfolio	
	2020: 100% passed; n=4				
outcome.	2019: 100% passed; n=4	minimum 70% passing exam	physical environments and earth resources	Hydrogeology	in physical environments and earth resources
Students are performing at a high	2018: 100% passed; n=5	Target is a 90% passing assignment;	Grading scale that assesses knowledge in	OPTION 1: Measured through Comprehensive	EEPS majors will demonstrate knowledge in basic concepts
Proficient knowledge of anatomy has been demonstrated.	90% of students scored 80% or better.	80% of students will score 80% Or <	Rubric	Comprehensive Exam	Students will have a basic understanding of human anatomy.
Analysis	Results	Target/Criteria (desired program level achievement)	Assessment Tool (e.g. rubrics, grading scale)	Assessment Type (e.g., portfolios, exams)	Learning Outcomes (most programs will have multiple outcomes)

MS students in EEPS program will demonstrate a mastery of advanced topics in geoscience. geoscience.				geosciences and physical sciences	EEPS majors will demonstrate ability to design and analyze lab and field experiments in	
Measured through either completion of thesis or project	GEOL 698: Independent Study in Geology	OPTION 1: Measured through Class Project in			OPTION 1: Measured through Lab Project in GFOL 720: Geochemistry	
Rubric includes assessment of organization, evidentiary support, logical reasoning, and quality of delivery. quality of delivery.	design and analyze lab and field experiments	Grading scale that assesses ability to		and field experiments	Grading scale that assesses ability to design and analyze lab	different spatial and temporal scales.
70% of students will score at least 80% on the assignment.	minimum 70% passing assignment	Target is a 90% passing assignment;		passing assignment	Target is a 90% passing assignment; minimum 70%	
100% completion.	2019: 100% passed project n = 2 2020: 100% passed project n = 1	2018: 100% passed project n = 2	2017: Data unobtainable; faculty retired	2016: Data unobtainable; faculty retired	2015: Data unobtainable; faculty retired	2020: 93% passed project; n=5
New from prior report. While 100% allows no room for improvement, the standard is appropriate. Graduate programs should not allow students to progress into their second year if they are not ultimately capable of succeeding.	outcome.	Students are performing at a high			See below	

2. Provide an analysis and evaluation of the data by learner outcome with proposed actions based on the results listed in Table 2. Data should relate to the goals and objectives of the program as listed in Part 1.

A review of the data confirms the department is successfully training students the material based on the existing assessment measures. The graduate program continues to successfully train students who document their knowledge in their thesis, project, or comprehensive exams. The 100% success rate is unchanged for several review periods.

Undergraduate students also are successfully learning the material, including ability to evaluate multidisciplinary scientific techniques associated with global issues that enable them to demonstrate understanding of Earth's physical environments and resource problems at different spatial and temporal scales.

### E. Assessment of Student Satisfaction

3. Use Table 3 and OPA Table 10 to provide analysis and evaluation using student majors' satisfaction (e.g., exit surveys from the Office of Planning and Analysis), capstone results, licensing or certification examination results (if applicable), employer surveys or other such data that indicate student satisfaction with the program and whether students are learning the curriculum (for learner outcomes, data should relate to the outcomes of the program as listed in 3d) to illustrate student satisfaction with the program and perceptions of program value.

Aggregat (e.g., cap	e data supporting stu stone, licensing/certif	dent success, by year, for th ïcation exam pass-rates)	e last four years
Year	# students	Capstone course final assignment grading scale: Field Geology (GEOL 640)	Qualitative Student Success Result
2017	22	84	high
2018	22	94	very high
2019	19	91	very high
2020	13 (COVID online)	90	very high





Figure 4: Student satisfaction with program

A significant measure of undergraduate major student success is the final mapping project in the capstone course (GEOL 640), which pulls together many of the fundamental concepts they have learned during their undergraduate tenure, indicating that students are well prepared and trained.

A drop in student satisfaction around 2014 coincided with fall in oil/gas prices and accompanying decrease in employment opportunities for which many students were being training (*Figure 4*). With a concerted effort to shine a light on other geoscience employment opportunities in environmental remediation, mapping and GIS, and support for other disciplines, the department has seen a rise in student satisfaction after 2018.

### F. General Education

1. Does your program support the university General Education program? igma Yes  $\hfill \label{eq:linear}$  No

If yes, please complete the table below by listing the general education courses and noting which of the general education outcomes are addressed in the class. If no, skip this question.

GEOL 111: 2016-2 General 92.5% Geology 2017-2 85.0%	GEOL 102: 2016-2 Earth Science 87.4% and the 2017-2 Environment 88.6% 2018-2 90.8% 2019-2 92.6%		Course Res
017:	017: 018: 019:		ults
50.00%	50.00%		Results Trend
Exam; 100% pass	Exam; 100% pass		Assessment Type
×	×	Have acquired knowledge in the arts, humanities, and natural and social sciences	Carconico
×	×	Think critically and independently	General Educa
		Write and speak effectively	ation Outcomes
×	×	Employ analytical reasoning and problem-solving techniques	

Table 3 General Education Outcomes

Note: Not a

2. Use Table 4 to further explain which goals of the *WSU General Education Program* are assessed in undergraduate programs (optional for graduate programs) and the results.

All of our Gen Ed course offerings assess three of the four goals of the GenEd program, including: (1) Have acquired knowledge in the arts, humanities, and natural and social sciences, (2) think critically and independently, and (3) employ analytical reasoning and problem-solving techniques.

### G. Concurrent Enrollment

If yes, provide the assessment of such courses over the last three years (disaggregated by each year) that assures grading standards (e.g., papers, portfolios, quizzes, labs, etc.) course management, instructional delivery, and content meet or exceed those in regular on-campus sections.

If no, skip to next question.

### H. Credit Hours Definition

Does the Program assign credit hours to courses according to Wichita State University Policy 2.18?
 ∑ Yes ∑No

If no, provide explanation.

### I. Overall Assessment

1. Define the overall quality of the academic program based on the above information and other information you may collect, including outstanding student work (e.g., outstanding scholarship, inductions into honor organizations, publications, special awards, academic scholarships, student recruitment and retention).

The Geology Department has a strong and relevant graduate and undergraduate curriculum that provides fundamental training in geology theory and practice (meeting KBOR standards), while providing students with new applications, experiences, and cutting-edge technology.

Students participate with faculty in research on a regular basis that <u>has</u> regional and national significance. Varying research is presented annually at national academic meetings. Students also participate in international academic and industry competitions, including the international AAPG (American Assoc. of Petroleum Geologists) Imperial Barrel Award. Wichita State team won the Mid-Continent section in 2018 in competition with teams from Univ. of Oklahoma, Oklahoma State, University of Kansas, and Kansas State University. This competition provides students and the department with important visibility in the corporate and employer circles.

The developing (1) Environmental Mineralogy Imaging Lab, (2) Geospatial and Geodynamics Lab, and (3) Earth Energy and Resources Lab provide an important service to our students, university, and the community at large. These labs provide analyses for groundwater quality, soil analyses, hazard mitigation, mapping services, and subsurface evaluation of conventional and alternative energy and mineral resources.

The department's Geology Field School is a nationally-recognized summer field camp program in the Bighorn Basin of Wyoming and Montana. The Field School builds student competence and self-confidence in working outdoors, independently and in groups, drawing inferences and conclusions from evidence, and trusting one's own judgment and reasoning. The Field School draws students from Kansas and across the country to an outdoor laboratory to test geologic concepts, interpret the rock and fossil record, visualize three dimensional geologic relationships, make and interpret geologic maps, and evaluate data used to make maps. Since 2014, students from over 25 different colleges and universities have participated in the WSU Field School program. This brings positive national exposure to the department programs, Wichita State University, and Kansas Regents schools.

### Part 4: Student Need and Employer Demand

Analyze the student need and employer demand for the program/certificate. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section).

### Complete the table below.

				Table 4	Employmen	t of Majors 202	20-2021	
	Program	Avg.	Employment	Employment	Employment	Employment	Pursuing graduate or	Projected growth from BLS**
	Name	Salary	In state (%)	in the field	related to the	outside the field	professional education (N)	
				(%)	field (%)	(%)		
Γ	Geology/EE	\$93,580	72%	80%	80%	20%	69%	7%
	PS							

\* <u>https://ksdegreestats.org/program\_search.jsp</u> and U.S. Bureau of Labor Statistics Website: <u>http://www.bls.gov/oco/</u> are good resources to view job outlook data and salary information (if the Program has information available from professional associations or alumni surveys, enter that data).

List any triggered programs with reason (majors/faculty/graduates).

• Geology programs have not been triggered

A. Provide a brief assessment of student need and demand using the data from Tables 11-15 from the Office of Planning and Analysis and from the table above. Include the most common types of positions, in terms of employment graduates can expect to find. Programs that are triggered for graduates or majors should get particular attention.



Geology is fundamentally an applied and practical discipline that supports industry and societal interests. Therefore, the overall student interest and enrollment in the subject is directly tied to the cyclical nature of its historically largest employers, in particular the oil and gas industry. Sustained high prices result in increased geoscientist employment and, in turn, much higher student enrollment. Likewise, when prices fall, lucrative employment opportunities decline and student interest wanes. This can be seen in our department enrollment trends. The number of undergraduate applicants to the geology program remained relatively high from 2010 to 2014. Since 2014, there has been a gradual drop in program

majors due to the decline in oil prices (*Figure 5*). This has returned the department to pre-2007 enrollment levels, when again, the price of oil was low. Because of the continued decline of the oil and gas sector, the U.S. Bureau of Labor Statistics employment outlook for geosciences have dampened from "much faster than average" at 14% in 2018, to "as fast as average" at 7% (see table above).

Since 2014, the department has been offering new courses and making concerted efforts to shine a light on other employment opportunities for geoscientists. It has hired faculty in hydrogeology (2014) and remote sensing (2018) fields as well as created a new Certificate in Environment and Sustainability (2020) to provide training in other areas of the geosciences (environmental remediation, water resources, land planning, GIS, etc). Meanwhile, the department maintains its traditional curriculum required for our students to be prepared for employment and be allowed to stand for state geologist certification exams.

### B. Briefly describe how the department and faculty have engaged in undergraduate strategic enrollment management including recruitment and retention activities and provide an assessment of successes, challenges, and deficiencies with those activities.

**Enrollment growth:** Our department has been involved in the following *recruitment actions*. We participate regularly in Black and Yellow recruitment days in both Fall and Spring semesters by hosting a recruitment booth. Throughout the year, the department chair and faculty meet with prospective students and families that have indicated interest in the geosciences. The department faculty continue to help with the annual Science Olympiad at WSU and the Wichita Regional Science & Engineering Fair at Exploration Place. Our department provided program information to middle and high school participants in both events. We have given voluntary lectures on geology and paleontology in local and regional K-12 public schools. The department has developed presentations for introductory geology courses and developed material for dissemination. We also emphasize local jobs in geosciences and direct students to employment links at the department webpage. Additional interest in the department and discipline to campus population and K-12 students is through the department's Facebook and Instagram pages. This social media approach has provided an additional means of communicating with current students and recruiting potential K-14 and community college students. The department has developed information packets and brochures about the geology profession and department curriculum. At the beginning of each semester and at mid-term, we approached students to confirm that they had declared geology as their major. This was achieved through individual contact, email, and social network sites.

**Persistence rates:** Our department is active in the following *retention activities*. The department chair contacts students who were enrolled in prior years to ascertain their current status and work with them to complete their degree. The Geology Department awards over \$30K in scholarships to help students focus on their education and remain in school. Students were encouraged at every opportunity to apply for department and college scholarships. Communication of these opportunities is achieved through individual contact, email, and social network sites.

**Non-degree, for-credit enrollment:** A multi-disciplinary team of faculty from Anthropology, History, Business, the Library, Criminal Justice, and Geology created a certificate in GIS. This certificate will help students achieve certification in GIS for careers in city planning, geosciences, real estate, the military, and police work. The Geology Department also offers a series of classes on the geology of natural disasters, oceanography, and meterology through the Office for Workforce, Professional and Community Education. In addition, we developed a half-credit badge course for high school students for the introduction of concepts in geology.

### B. Briefly describe how the department and faculty have engaged in graduate strategic enrollment management including recruitment and retention activities and provide an assessment of successes, challenges, and deficiencies with those activities.

**Recruitment** is part of larger effort to align our undergraduate programs with the EEPS program to increase EEPS enrollment. Student involvement in geology clubs and activities also increases their likelihood to continue into graduate work. One student activity that proved successful in engaging students and encouraging them into our EEPS program is the Imperial Barrel Award (IBA) competition, a competition for petroleum geoscience graduate students from universities around the world. University teams compete to win scholarship funds for their geoscience department and the international recognition that comes from competing or winning in the competition. In 2018, WSU Geology's team won the regional competition against the University of Oklahoma, Oklahoma State, Kansas State, and University of Arkansas. Faculty also participate at regional and national conferences to host a recruiting booth and present program information to potential students.

Our department is active in the following EEPS **retention activities**. The department requires all incoming students to take EEPS 702 (Research Methods) their first semester in the program, which has been refashioned to introduce students to how to approach grad school, differences from undergraduate classes, research approaches, and student-advisor relationships. This has begun to have a positive effect on student success in our graduate program. In addition, our GTAs support the university's overall mission to retain quality undergraduate students as they move toward degree completion by teaching labs and assisting in classes. Teaching a wide breadth of classes also reinforces their own understanding and interest in the discipline, thus helping in graduate retention as well.

### D. Also address student enrollment, degree production and employment outcomes for diverse students.



The WSU geology degree programs have seen a significant increase in underrepresented minorities over the past 10 years. We have been successful at both recruiting, retaining, and graduating minority ethnicities, including Black, Hispanic, Native American, and multi-race students (*Figures 6 and 7*)

Figure 6: Representation of % URM students in Geology UG program



Figure 7: URM students in Geology EEPS MS program vs entering GPA scores

### Part 5: Program Service

Analyze the service the Program/certificate provides to the discipline, other programs at the University, and beyond. Complete for each program if appropriate. Data tables 1, 2, 3 and 5a, b and c provided by the Office of Planning Analysis (covering SCH by FY and fall census day, instructional faculty; instructional FTE employed; program majors; and degree production) can be used to partially address this section. (Refer to instructions in the WSU Program Review document for more information on completing this section).



A. Provide a brief assessment of the service the Program provides using SCH by

*Figure 8: Department SCH production (total and 100-400 level courses)* 



Figure 9: Percent SCH taught by Instructor Type

Overall department SCH production (*Figure 8*) is strongly correlated to the larger enrollment in our lower level nonmajor GenEd service courses (GEOL 102, 111, 235, 300, 302, 310).

During the period of this review, the department has not changed the number of low-level sections offered. The SCH per tenure-eligible faculty members has increased, however, as faculty numbers have decreased (*Figure 9*).

A sustained enrollment decline in lowerlevel non-major classes began in 2013, which reflects the trend across Fairmount College of Liberal Arts and Sciences (LAS) as a whole (Figure 10). Lower-level nonmajor course SCH decline is driven by outside factors including GenEd demands, concurrent enrollment (not an issue for Geology as the subject is not taught in high schools), and the development of Shocker OneStop advising as part of the broader university transfer of resources and students to professional degrees in Engineering, Business, and Health Professions. Since the implementation of Shocker OneStop advising in 2013, we have observed a shift in advising and placement of First- and Second-Year students away from LAS and further from coordination with individual academic units. As a result, First- and Second-year OneStop advising is working from a position of unfamiliarity to the geoscience discipline and employment opportunities. A loss of coordination with the department results in a reduction in placement in geology non-major courses.



Figure 10: Total SCH production by Geology and LAS



Figure 11: Upper-level Geology SCH production

the new GIS (Geographic Information System) Certificate with the Department of Anthropology. Geology teaches many of the core and elective courses associated with that GIS certificate and a large number of the students in that program originate from Geology.

### *C. Provide a brief assessment of the service the Program provides to the institution and beyond.*

The Geology faculty provide significant service to the institution and to the fields we serve. Faculty service productivity exceeds expectations. Faculty serve as experts to local media and industry on topics ranging from earthquake activity to groundwater issues to energy topics. Several faculty serve on the national and regional committees of their respective organizations, including the Geological Society of America (GSA), American Association of Petroleum Geologists (AAPG), and The Geological Society (London, UK), and the Geological Society of Kansas (KGS). Our faculty are engaged in a wide variety of community-oriented service activities as well, increasing the connection between the expertise of the department and the greater Wichita community, including providing geoscience-related support to <u>local</u> public schools\_and <u>running events at</u> the annual Science Olympiad secondary school regional <u>and state</u> competition.

Conversely, the geology department, along with LAS advising, takes a direct role in recruiting and advising its own majors with little to no assistance from the university at large. As a result, SCH production in geology majors courses (500-800), while small compared to the lower-level course offerings, has increased over the last decade (Figure 11). A decline in 2018 resulted from the graduation of a large contingent of UG and EEPS majors that began their degree when oil prices were high. The geology major SCH is correcting and production in majors is on the climb again. However, these numbers will not dramatically impact the larger SCH production decline in our lower-level courses being driven by forces outside the control of the department and LAS college.

### B. Provide a brief assessment of the service the Program provides to other university programs.

The department serves the university agenda through offering numerous Gen Ed courses and presenting a science discipline that many incoming students have not been exposed to in their secondary education. We recently implemented a new Certificate in Environment and Sustainability, which emphasizes the geoscience contribution to these issues to the university and broader society. We are heavily involved in creating and supporting

### Part 6: Impact of Previous Self-Study Recommendations

At the conclusion of the last program self-study performed, the committee provided recommendations for improvement for the department. Please list those recommendations and note your progress to date on implementation.

Committee Recommer	ndation from la	<b>ast review?</b> Forward Facing Goals Resubmitted (	Date2/26/2019)
Internal Follow-up Recomm	nendation:		
2-year Follow-Up	NA		
KBOR Recommendation:			
Enhanced	Maintained	d Monitored for improvement	Discontinued

Complete the table.

	5	
Recommendation	Activity	Outcome
Include cultural component to	work to add cultural component to	added cultural component to
department mission statement	department mission (purpose)	department purpose statement
	statement	
Add one or two more learning outcomes for the B.S. program (currently have 2, EEPS has 4)	add more learning outcomes for BS program	new learning outcomes added
Use of more assessment tools on learning outcomes in addition to class assignments (page 10)	add more assessment tools to learning outcomes	new assessments added
Set new goals for next Program Review - goals are the same as last year, and these goals were met	faculty consultation to redefine goals	new goals defined

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outcome. Complete for each program if appropriate (refer to instructions in the WSU Program Review document for more information on completing this section). Report on the Program's/certificate's goal (s) from the last review. List the goal(s), data that may have been collected to support the goal, and the

### Complete the table.

5. By year two of the next program review period, engage in creating the department submit a proposal for an engage in development and sustainability	4. By the end of the second year of the next program examine feasibility review period, the department will examine the feasibility of 2 additional lower-level online course offerings to help increase enrollment and visibility of discipline.	3. By the end of the second year of the next program Examine feasibility review period, the department will organize a professional lecture series to bring professional "Industry" experiences and connections to students.	2. During the first year of the next program review Two new learning c period, the department will define 1-2 new additional learning outcomes for the B.S. degree program.	<ol> <li>During the first year of the next program review period, the department will define 1-2 new assessment tools beyond class assignments for the B.S. program.</li> </ol>	Goal(s) Assessment Data A	Table 6 Result
Certificate in Environment and Sustainability; ment of GIS Certificate	of lower-level online course offerings	of creating professional lecture series	bbjectives defined	students taking state ASBOG exams	nalyzed	ts of Goals from Last Review
Certificate instituted in 2020	created three repeating online course offerings: GEOL 235, GEOL 300, and GEOL 310 in addition to existing GEOL 102	Weekly professional lecture series created in coordination with KS Geological Society professionals in Wichita	Two new learning objectives defined	100% of former students passed ASBOG general geology exam	Outcome	
Completed goals; continue development of programs	Completed goal	Completed goal	Completed goal	Continue assessing goal	Status (Continue, Replace, Complete)	

6. Through the period of the next program review,	BS Geology program worked to:		Continue working
the department will maintain enrollment and	<ul> <li>Successfully recruit 15 new majors at the freshman and</li> </ul>	<ul> <li>recruited ~14 F/S students</li> </ul>	towards
graduation numbers above the KBOR minima.	sophomore level each year	<ul> <li>maintained &gt;25 J/S except</li> </ul>	maintaining goals
	<ul> <li>Maintain the number of juniors and seniors at greater than 25</li> </ul>	2020	
	each year	<ul> <li>&gt;25 degrees conferred in</li> </ul>	
	<ul> <li>Maintain the number of graduates at greater than 10 each</li> </ul>	2017, and <10 in 2018-20	
	year		
		<ul> <li>maintained &gt;10 except</li> </ul>	
	EEPS MS program worked to:	2020	
	<ul> <li>Successfully recruit 10 new students to the program each year</li> </ul>	<ul> <li>sustained &lt; 20 majors</li> </ul>	
	<ul> <li>Maintain a minimum of 20 majors in the program each year</li> </ul>	<ul> <li>exceeded 5 degrees</li> </ul>	
	<ul> <li>Graduate a minimum of 5 each year</li> </ul>	conferred each year	
7. Through the period of the next program review,	Advocate for additional and replacement faculty	<ul> <li>replaced one faculty in</li> </ul>	Continue
the department will advocate for 2-3 additional		2018	advocating for new
department full-time research faculty critical to		<ul> <li>added one faculty in 2019</li> </ul>	research faculty
strengthening and build current curriculum and graduate program.			

## Part 8: Forward-facing Goals

Identify goal(s) for the Program to accomplish in time for the next review. Goals must be **Specific, Measurable, Attainable, Realistic and Time-bound** (SMART) and should be tied to the university and college strategic plans.

	Table 7 Forward Facing	) Goals for Program I	Review Period		
Program/Certificate Goal	Specific	Measurable	Attainable	Realistic	Time- bound
Ex. To improve student learning outcomes (exam scores) by supporting Supplemental Instruction from four sections to seven by fall 2020.	Yes – Exam Scores	Yes – How many sections.	Yes – budget approved. Discussed with OSS.	Yes – Within the scope of responsibility.	Yes – Fall 2020
1. By the end of the next program review period, the department will develop and implement marketing and promotional materials to increase participation in our degree and environmental certificate programs	Marketing materials (e.g. videos, social media posts, pamphlets, etc)	Yes; analyze number of students participating in program	Yes; resources available to complete	Yes; resources and timing are realistic	Yes; by end of next program review
2. Through the period of the next program review, continue working to maintain enrollment and graduation numbers above the KBOR minima. the KBOR minima	<ul> <li>BS Geology program:</li> <li>Successfully recruit 15 new majors at the freshman and sophomore level each year</li> <li>Maintain the number of juniors and seniors at greater than 25 each year</li> <li>Maintain the number of graduates at greater than 10 each year</li> <li>EEPS MS program worked to:</li> <li>Successfully recruit 10 new students to the program each year</li> </ul>	Yes; analyze number of students enrolling in courses and majoring in degree and certificate programs programs	Yes; resources available to complete	Yes; resources available to complete	Yes; by end of next review review

6. Through the period of the next program review, develop and promote department Geospatial Analysis Research Lab	5. Through the period of the next program review, promote department Environmental Mineralogy Research Lab	4. Through the period of the next program review, the Geology Field School will market its in-person and virtual programs to a national and international audience to build enrollment and grow national reputation.	<ol> <li>Through the period of the next program review, the department will advocate for 2- additional department full-time research faculty critical to strengthening and building current curriculum and graduate program.</li> </ol>	
Increase publications in research area; develop Geospatial Analysis Lab; attract students	Increase publications in research area; develop Environmental Mineralogy research lab; attract students	Marketing materials (e.g. advertisements, videos, social media posts, pamphlets, etc)	Advocate for additional and replacement faculty	<ul> <li>Maintain a minimum of 20 majors in the program each year</li> <li>Graduate a minimum of 5 each year</li> </ul>
Yes; analyze number of publications, grants, participating students; develop physical research lab	Yes; analyze number of publications, grants, participating students; develop physical research lab	Yes; analyze number and location of outside guest students participating in program	Yes; count number of faculty in department	
Yes; resources available to complete: supported in collaboration with Convergent Science group: Disaster Resilience Analytics Center	Yes; resources available to complete: recently acquired NSF equipment grant; established lab fees	Yes; resources available to complete: Woolsey field camp endowment fund	Depends on LAS and university priorities and resources; out of our control, but advocate for positions to keep department competitive	
Yes; resources and timing are realistic	Yes; resources and timing are realistic	Yes; resources and timing are realistic	Possible; again, depends on LAS and university priorities and resources; out of our control	
Yes; by end of next program review	Yes; by end of next program review	Yes; by end of next program review	Yes; by end of next program review	

	Lab	research lab in Earth Energy and Resources	review, develop and promote department	7. Through the period of the next program
	attract students	resources research lab;	research area; develop Earth	Increase publications in
participating students; develop physical research lab	grants,	publications,	number of	Yes; analyze
	fund	petroleum endowment	complete: Woolsey	Yes; resources available to
			timing are realistic	Yes; resources and
	review	program	of next	Yes; by end

Provide any additional narrative covering areas not yet addressed.