

Concurrent undergraduate and graduate degree programs can provide opportunities for well-qualified ISU juniors and seniors to apply for a program leading to both a masters and bachelors degree at the end of a fifth year of study. Students interested in research may apply for a graduate research assistantship during their fourth and fifth years of study. Individualized concurrent degree programs are available.

The following material describes the procedures to obtain approval for a recognized concurrent undergraduate and graduate degree program when both the undergraduate and graduate majors have already been approved. For students pursuing a concurrent undergraduate bachelor's degree and graduate degree, a maximum of 6 graduate credits can be double counted for both the bachelor's degree and the graduate degree subject to the Program of Study Committee approval.

The proposal will be reviewed by the Graduate Curriculum and Catalog Committee, by the Graduate Council, by the Graduate College, and by the Dean of the Graduate College.

1. Name of the programs or majors

Geology

2. Name of the degrees

BS Geology, MS geology

3. Name of the department(s) which administer(s) the program

Geological & Atmospheric Sciences

4. Rationale for the concurrent degree program

The American Geosciences Institute (AGI) estimates a shortage of 135,000 geoscientists by the year 2022. This estimate comes from the number of current geoscientists reaching retirement age and the growing demand for geoscientists across many fields to understand and address solutions for both climate change and the safe development of energy and natural resources. The Bureau of Labor Statistics predicts a 10% growth in geoscience jobs between 2014 and 2024 compared to 7% across all occupations (Bureau of Labor Statistics, 2015). Approximately 6,000 people earn a BS degree in a geoscience field each year (National Science Board, 2016), hence to meet future demands for geoscientists we need a more intentional focus on attracting, supporting, and training new students.

The ability to earn concurrent B.S. and M.S. degrees within 5 years is motivated by the M.S. becoming the degree of choice in many disciplines, including geoscience professions (e.g., in oil and gas). If the degrees are taken sequentially, it takes on average 4.24 years to earn a BS and 3.06 years to earn a MS degree in the geosciences (Wilson, 2013). This extended time could discourage students interested in a science, technology, & engineering (STEM) career from pursuing a degree in the geosciences in favor of a degree in engineering, for example, where starting positions only require a B.S. degree. A concurrent degree in geology has the potential to

attract high-caliber students to our program, and prepare them well for a career in industry, both as a uniquely qualified employee or as an independent consultant.

Finally, these concurrent degrees exist only at Penn State and University of Texas El Paso, but they are not well known. We plan to test the effectiveness of these degree paths at ISU and disseminate the outcomes as a model for other geoscience departments across the country.

5. Admission procedures and requirements

Qualified students interested in pursuing the concurrent degrees will be required to complete the necessary paperwork to apply to the graduate program by January of their junior year. The Geology Graduate Application Committee will review applications following the same procedure used for MS geology candidates, i.e., GRE scores, three letters of reference, and a personal statement. A 3.5 or higher GPA will be required for concurrent degree candidates.

Students intending to apply to the BS/MS geology degree will discuss research interests with the undergraduate advisor in their sophomore year, and identify possible graduate advisors with the relevant expertise before applying to the program in January of their junior year. The student and graduate advisor will agree between a thesis or creative component option. The student will also be considered for a TA or RA following the procedure currently in use in the geology program.

6. Requirements of the program

Students pursuing the BS/MS geology degree will complete 6 credits of geology required (e.g. GEOL 579, 3 cr.) or electives at the 500 level that will count both for the BS and MS degrees. In addition the student will complete 6 research credits and 18 credits of 500-level geology electives in the 4th and 5th year.

7. Expected enrollment

Two to four students per year.

8. If not already addressed, answer the following:

- a. How will the undergraduate degree plan and graduate program of study be developed?

The student will work with the undergraduate advisor and graduate advisor/major professor to develop a program of study for the BS/MS geology.

- b. When will the student have a major professor?

End of spring of junior year or early fall of senior year.

- c. Will graduate assistantships be provided?

Students will be eligible for a graduate assistantship but like for MS students accepted in the MS geology program, it is not guaranteed and based upon availability of TA or RA funds.

- d. Will a thesis be required?

A thesis or creative component will be required. Both options are currently available in the MS geology program.

- e. Who will be responsible for the administration of the program?

Cinzia Cervato, Morrill Professor of Geological & Atmospheric Sciences, 224 Science I, cinzia at iastate.edu, 294-7583.

f. How much time is required to complete the program? Show a sample semester-by-semester plan.

Attached - 5 years (year 3-5 shown here). MS courses in yellow.

Semester 5	Semester 6	Semester 7	Semester 8	Semester 9	Semester 10
Geol 368 Sed/Strat 4 cr.	Adv. geol. elective (500-level) 3 cr.	Geol 579 Surf. Processes 3 cr.	Foreign language 3 cr.	Geol 500-level elective 3-4 cr.	Geol 500-level elective 3-4 cr.
A&H elective 3 cr.	Soc. science elective 3 cr.	Foreign language 3 cr.	Geol 599 - research 3 cr.	Geol 599 - research 3 cr.	Geol 500-level elective 3-4 cr.
Soc. science elective 3 cr.	Geol. elective 3 cr.	Geol 500-level elective 3-4 cr.	Geol 500-level elective 3 cr		
Science/Math choice 3 cr.	Geol elective 3-4 cr.				
Engl. 314 3 cr.	Science/Math choice 3 cr.				
	Geol 302 Field camp 6 cr. (summer)				
16/83	23/106	6/112	3/115	3/118	3/121
	3/3	6/9	6/15	7/22	8/30

g. Will students be allowed to double count credits? If so, how many?

Six 500-level credits will double count.

9. Attach memos showing approval by appropriate department and college committees, faculty, and administrators.

10. Proposal Contact

Cinzia Cervato, Morrill Professor of Geological & Atmospheric Sciences, 224 Science I, cinzia at iastate.edu, 294-7583.

Degrees	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8	Semester 9	Semester 10
BS Geology (120 credits minimum)	Geol 100 Physical Geology 3 cr.	Geol 102 Hist. Geology 3 cr.	Geol 315 Mineralogy 3 cr.	Geol 365 Petrology 3 cr.	Geol 368 Sed/Strat 4 cr.	Adv. geol. elective (500-level) 3 cr.	Geol 579 Surf. Processes 3 cr.	Foreign language 3 cr.	Geol 500-level elective 3-4 cr.	Geol 500-level elective 3-4 cr.
	Geol 100L Lab 1 cr.	Geol 102L Lab 1 cr.	Geol 315L Lab 1 cr.	Geol 356 Struct. Geology 4 cr.	A&H elective 3 cr.	Soc. science elective 3 cr.	Foreign language 3 cr.	Geol 599 - research 3 cr.	Geol 599 - research 3 cr.	Geol 500-level elective 3-4 cr.
	Engl. 150 Crit. Thinking 3 cr.	Math 166 Calculus II 4 cr.	Geol 316 Optical Min. 1 cr.	Geol 357 Lab 1 cr.	Soc. science elective 3 cr.	Geol. elective 3 cr.	Geol 500-level elective 3-4 cr.	Geol 500-level elective 3 cr		
	Math 165 Calculus I 4 cr.	Chem 178 3 cr.	Phys 111 5 cr.	Engl. 250 3 cr.	Science/Math choice 3 cr.	Geol elective 3-4 cr.				
	Geol 112 Earth Wind & Fire LC 1 cr.	Chem 178L 1 cr.	A&H elective 3 cr.	A&H elective 3 cr.	Engl. 314 3 cr.	Science/Math choice 3 cr.				
	Chem 177 4 cr.	A&H elective/Int. persp. 3 cr.	Soc Science elective/U.S. Diversity 3 cr.	Phys 112 5 cr.						
	Chem 177L 1 cr.	Geol 113 Earth Wind & Fire LC 1 cr.	Lib. 160 1 cr.			Geol 302 Field camp 6 cr. (summer)				
BS 121 cr.	17/17	16/33	17/50	17/67	16/83	23/106	6/112	3/115	3/118	3/121
MS 30 cr.						3/3	6/9	6/15	7/22	8/30