

# Department of Geography

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## DEGREE PROGRAMS OFFERED

BA, major in Geography  
BS, major in Geography  
BS, major in Geography (with Teacher  
Certification-Social Studies Composite)  
BS, major in Geography –  
Geographic Information Science  
BS, major in Geography – Physical Geography  
BS, major in Geography –  
Resource and Environmental Studies  
BS, major in Geography –  
Urban and Regional Planning  
BS, major in Geography – Water Studies

## MINORS OFFERED

Geography  
Geology  
Nature and Heritage Tourism

## CERTIFICATES OFFERED

Environmental Interpretation  
Geographic Information Systems  
Water Resources Policy

Texas State Geography boasts the largest undergraduate program in the United States. The Journal of Geography, the Association of American Geographers, and a National Program Effectiveness Survey recognized the Department as among the best undergraduate Geography programs in the nation. Additionally, the Department of Geography's internship program is the largest of its kind, placing students in both government agencies and private enterprises to provide students real-world experience to complement their academic program. The Department also offers highly acclaimed field experiences to places such as Big Bend National Park, the Southwestern United States, Europe and Mexico, where students gain invaluable firsthand geographical knowledge while gaining academic credit.

The undergraduate geography program offers a variety of major concentrations of study. Students may select a Bachelor of Arts (B.A.) or a Bachelor of Science (B.S.). The degrees provide students programs and courses designed to increase their understanding of the world they live in and to help students develop analytical skills necessary to interpret and solve real-world problems. The B.A. requires a minimum of 30 semester hours of Geography while the B.S. requires a minimum of 36 hours of Geography coursework. Geography majors may include a maximum of two additional Geography courses towards their major. General Education Core requirements are listed in the University College section of this catalog. Geography majors are required to complete a minor and are encouraged to select a minor in consultation with an academic advisor.

## Admission Process

Students meeting university admission standards enter the undergraduate Geography program as pre-majors. To become majors, students must:

1. Complete GEO 1309 or 1310; GEO 2410, and GEO 3301 (10 semester hours) with a grade of "C" or higher in each course.
2. Complete 45 or more hours with an overall Texas State GPA of at least 2.25.

## Academic Advising

The Department of Geography provides extensive academic advising services which include individual and group advising. All geography majors and minors are encouraged to seek advice about program requirements and course selection each semester. Major concentration faculty and academic advisors can offer detailed program and course information as well as course checklists for each major concentration. Proper academic planning and academic advising leads students toward completing the steps for satisfying graduation requirements.

**Bachelor of Arts**  
**Major in Geography**  
 Minimum required: 120 semester hours

The General Geography major provides flexibility in designing unique programs for students with highly specialized career or graduate study objectives. Students electing to follow this major are strongly encouraged to work with a faculty member with experience in their special area of interest.

**General Requirements:**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, GEO 2410 & GEO 3301 with grades of "C" or higher in each course.
  - b. Complete 45 or more credit hours with a cumulative Texas State GPA of at least 2.25.
2. To satisfy graduation requirements, students must have at least a 2.50 Geography major GPA and at least a 2.25 Texas State GPA.
3. Majors must complete at least 30 hours of Geography coursework including a Geography Techniques Course to be selected from: GEO 2426, 3411, 3416, 4430.
4. Geography required elective courses (16 hours) to be selected in consultation with your academic advisor.
5. The degree requires students to select a minor area of study from the approved list of minors offered at Texas State. Biology, Chemistry, Geology, Anthropology, Computer Science, Mathematics, Plant and Soil Science, or Physics are minors that are highly recommended to complement your Geography major. Other minors may be appropriate depending upon your interests and career goals. Discuss other possible options with your academic advisor.
6. Texas State requires a minimum of 120 semester hours of coursework to graduate including:
  - a. general education core requirements;
  - b. major requirements;
  - c. minor requirements
  - d. additional College/degree requirements, which include an additional sophomore English literature course and 14 hours of the same modern language (1410, 1420, 2310, 2320) and
  - e. additional elective courses, as needed, to achieve the minimum 120 hours required for graduation of which 36 hours must be advanced (3000–4000) level courses, and at least 9 semester hours must be writing intensive (WI).

Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
ENG 1310	3	HIST 1310	3	COMM 1310	3	POSI 2320	3
US 1100	1	ENG 1320	3	GEO 3301	3	ENG 2310, 2320, 2330, 2340, 2359	
GEO 1309 or 1310	3	GEO 2410	4	ENG Literature 2310, 2320, 2330, 2340, 2359, or 2360	3	or 2360	3
POSI 2310	3	Natural Science Component	3-4	Modern Language 1410	4	Modern Language 1420	4
Natural Science Component	3-4	PFW 1 course	1	HIST 1320	3	GEO techniques 2426, 3411, 3416, 4430	4
MATH 1315 or above (not 1316)	3			PFW one course	1	PHIL 1305 or 1320	3
<b>Total</b>	<b>16-17</b>	<b>Total</b>	<b>14-15</b>	<b>Total</b>	<b>17</b>	<b>Total</b>	<b>17</b>

Junior Year - 1st Semester		Junior Year - 2nd Semester		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
ART, DAN, MU, or TH 2313	3	GEO, Advanced	7	GEO, Advanced	3	Electives (as needed)	6
Social Science Component	3	Minor	6	Electives (as needed)	6	Minor	6
GEO, Advanced	6	Modern Language 2320	3	Minor	3		
Minor	3-4						
Modern Language 2310	3						
<b>Total</b>	<b>15-16</b>	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>12</b>	<b>Total</b>	<b>12</b>

**Bachelor of Science  
Major in Geography  
Minimum required: 120 semester hours**

The General Geography major provides flexibility in designing unique programs for students with highly specialized career or graduate study objectives. Students electing to follow this major are strongly encouraged to work with a faculty member with experience in their special area of interest.

**General Requirements:**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, GEO 2410 & GEO 3301 with grades of "C" or higher in each course.
  - b. Complete 45 or more credit hours with a cumulative Texas State GPA of at least 2.25.
2. To satisfy graduation requirements, students must have at least a 2.50 Geography major GPA and at least a 2.25 Texas State GPA.
3. Majors must complete at least 36 hours of Geography coursework including a Geography Techniques Course to be selected from: GEO 2426, 3411, 3416, 4430.
4. Geography required elective courses (22 hours) to be selected in consultation with your academic advisor.
5. The degree requires students to select a minor area of study from the approved list of minors offered at Texas State. Biology, Chemistry, Geology, Anthropology, Computer Science, Mathematics, Plant and Soil Science, or Physics are minors that are highly recommended to complement your Geography major. Other minors may be appropriate depending upon your interests and career goals. Discuss other possible options with your academic advisor.
6. Texas State requires a minimum of 120 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) minor requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303—Technical writing and 8 hours of modern language (if students completed two years of the same modern language in high school, then no additional courses are required, e) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation of which 36 hours must be advanced (3000–4000) level courses, and at least 9 semester hours must be writing intensive (WI).

Freshman Year - 1st Semester		Freshman Year - 2nd Semester		Sophomore Year - 1st Semester		Sophomore Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
ENG 1310	3	HIST 1310	3	COMM 1310	3	POSI 2320	3
US 1100	1	ENG 1320	3	GEO 3301	3	ENG 2310, 2320, 2330, 2340, 2359	
GEO 1309 or 1310	3	GEO 2410	4	ENG Literature 2310, 2320, 2330, 2340, 2359, or 2360	3	or 2360	3
POSI 2310	3	Natural Science Component	3-4	Modern Language 1410 (if required)	4	Modern Language 1420 (if required)	4
Natural Science Component	3-4	PFW 1 course	1	HIST 1320	3	GEO techniques 2426, 3411, 3416, 4430	4
MATH 1315 or above (not 1316)	3			PFW one course	1	PHIL 1305 or 1320	3
<b>Total</b>	<b>16-17</b>	<b>Total</b>	<b>14-15</b>	<b>Total</b>	<b>17</b>	<b>Total</b>	<b>17</b>

Junior Year - 1st Semester		Junior Year - 2nd Semester		Senior Year - 1st Semester		Senior Year - 2nd Semester	
Course	Hr	Course	Hr	Course	Hr	Course	Hr
ART, DAN, MU, or TH 2313	3	GEO, Advanced	7	GEO, Advanced	6	Electives (as needed)	3
Social Science Component	3	Minor	6	Minor	3	Minor	6
GEO, Advanced	6	Electives (as needed)	3	Electives (as needed)	3	GEO, Advanced	3
Minor	3-4						
<b>Total</b>	<b>15-16</b>	<b>Total</b>	<b>16</b>	<b>Total</b>	<b>12</b>	<b>Total</b>	<b>12</b>

## Secondary Teacher Certification

Secondary Teacher certification is available in the Bachelor of Science (BS) degree only, under the Social Studies Composite Certification Program. Dr. Brock Brown serves as the undergraduate departmental advisor for those students interested in seeking teacher certification.

The Social Studies Composite Certification program is designed to prepare students to teach any of the four social studies disciplines (History, Geography, Government, and Economics) at the secondary level (grades 8-12). Upon completion of the social studies curriculum and passage of the social studies TExES test, students will receive certification in social studies and eligibility to teach in any of the four disciplines. Students pursuing secondary certification with a major in Geography select a minor from the disciplines of History or Political Science. In addition, students will complete specific courses in the third social studies discipline not chosen as a major or minor.

## Student Teaching And Licensing Exam Requirements

To be allowed to student teach (EDST 4681) and take the Secondary Composite TExES, students must have:

1. Students must have successfully completed all coursework (including HIST 4300) for certification prior to student teaching and within the six years immediately before taking the TExES licensing exam for teachers.
2. Students must have an cumulative Texas State GPA, Geography, History, and Political Science GPA of 2.50 or higher with no grade lower than a “C” in each discipline.
3. All external students taking the TExES at Texas State must meet the same requirements.

<p><b>Bachelor of Science</b>  <b>Major in Geography</b>  <b>(Social Studies Composite Teacher Certification: History Minor and Political Science Third Field)</b>  <b>Minimum required: 133 semester hours</b></p>									
<p><b>General Requirements:</b></p> <ol style="list-style-type: none"> <li>1. An additional geography course is required to meet B.S. Program requirement of 36 hours. Consult with your Advisor. This option in secondary teacher certification requires completion of the following 36 hours in Geography: GEO 1309, 1310, 2410, 3301, 3303, 3309, 3313, 3329, 4340; three hours from GEO 3307, 3308, 3328, 3332, 3333, 4328; four hours from 2426, 3411, 3416, 4430, and one Geography elective with a grade of “C” or better in each of the courses.</li> <li>2. The minor in History (24 hours) requires completion of the following History courses: HIST 1310, 1320, 2311, 2312, three hours advanced Group A (World History), three hours advanced Group B (European History); three hours advanced Group C (American History) and one advanced History elective or HIST 4300 with a grade of “C” or better in each of the courses.</li> <li>3. The third field in Political Science (15 hours) requires completion of the following courses: POSI 2310 and 2320; three hours from Group 3 (Public Law) from POSI 3310, 3311, or 4311, and 6 hours of Political Science from Group 2 (American Government) with a grade of “C” or better in each of the courses.</li> <li>4. In addition to the major, minor, and third field requirements, students must also complete 21 hours of professional sequence courses under the College of Education: CI 4370, 3325, 4332, 4343; RDG 3323; and EDST 4681 (Student Teaching). All coursework must be completed prior to student teaching.</li> <li>5. To satisfy graduation requirements for teacher certification, students must have at least a 2.50 Geography major GPA and at least a 2.5 Texas State GPA and a 2.50 GPA in the second and third teaching field.</li> <li>6. This degree program requires a minimum of 133 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) second and third teaching field requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303—Technical writing and 8 hours of modern language [if students completed two years of the same modern language in high school, then no additional courses are required, e) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation of which 36 hours must be advanced (3000—4000) level courses, and at least 9 semester hours must be writing intensive (WI).</li> </ol>									

**Bachelor of Science  
Major in Geography  
(Social Studies Composite Teacher Certification: Political Science Minor and History Third Field)  
Minimum required: 133 semester hours**

**General Requirements:**

1. An additional geography course is required to meet B.S. Program requirement of 36 hours. Consult with your Advisor. This option in secondary teacher certification requires completion of the following 36 hours in Geography: GEO 1309, 1310, 2410, 3301, 3303, 3309, 3313, 3329, 4340; three hours from GEO 3307, 3308, 3328, 3332, 3333, 4328; four hours from 2426, 3411, 3416, 4430, and one Geography elective with a grade of "C" or better in each of the courses.
2. The minor in Political Science (21 hours) requires completion of the following courses: POSI 3300 (or 3301) and 2310 and 2320, 6 hours from Group 2 (American Government), 3 hours from Group 3 (Public Law) selected from POSI 3310, 3311, OR 4311, and POSI 4398.
3. The third field in History (18 hours) requires completion of the following: HIST 1310, 1320, 2311, 2312, three hours Advanced Group B (European History) and three hours Advanced Group C (American History).
4. In addition to the major, minor, and third field requirements, students must also complete 21 hours of professional sequence courses under the College of Education: CI 4370, 3325, 4332, 4343; RDG 3323; and EDST 4681 (Student Teaching). All coursework must be completed prior to student teaching.
5. To satisfy graduation requirements for teacher certification, students must have at least a 2.50 Geography major GPA and at least a 2.5 Texas State GPA and a 2.50 GPA in the second and third teaching field.
6. This degree program requires a minimum of 133 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) second and third teaching field requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303—Technical writing and 8 hours of modern language [if students completed two years of the same modern language in high school, then no additional courses are required) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation of which 36 hours must be advanced (3000—4000) level courses, and at least 9 semester hours must be writing intensive (WI).

**Bachelor of Science  
Major in Geography – Resource and Environmental Studies  
Minimum required: 120 semester hours**

The Resource and Environmental Studies concentration prepares students for a wide variety of government and private sector occupations relating to resource conservation and/or environmental management. Graduates pursue careers with employers such as the Texas General Land Office, the Texas Commission on Environmental Quality, the Texas Department of Transportation, Texas Parks and Wildlife, the National Geographic Society, the Lower Colorado River Authority, the San Antonio Water System, Motorola, Valero Energy and various private – sector environmental consulting firms.

**General Requirements:**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, GEO 2410 & GEO 3301 with grades of "C" or higher in each course.
  - b. Complete 45 or more credit hours with a cumulative Texas State GPA of at least 2.25.
2. To satisfy graduation requirements, students must have at least a 2.50 Geography major GPA and at least a 2.25 Texas State GPA.
3. The degree requires students to select a minor area of study from the approved list of minors offered at Texas State. Biology, Chemistry, Geology, Anthropology, Computer Science, Mathematics, Plant and Soil Science, or Physics are minors that are highly recommended to complement your Geography major. Other minors may be appropriate depending upon your interests and career goals. Discuss other possible options with your academic advisor.
4. Geography Core Courses - at least three of the following: GEO 3434, 4313, 4338, 4350.
5. Geography Techniques Courses - at least one of the following: GEO 2426, 3411, 3416, 4430.
6. Geography Electives – Select from the following to complete semester hour requirement: GEO 2310, 2420, 2427, 3303, 3305, 3313, 3320, 3321, 3325, 3335, 3340, 3349, 4310, 4314, 4316, 4322, 4325, 4334, 4339, 4341, 4380, 4391, 4412.
7. Student may select one regional course to satisfy part of their Geography Electives - GEO 3307, 3308, 3309, 3328, 3329, 3332, 3333, 4306, 4328.
8. Texas State requires a minimum of 120 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) minor requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303—Technical writing and 8 hours of modern language [if students completed two years of the same modern language in high school, then no additional courses are required) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation of which 36 hours must be advanced (3000—4000) level courses, and at least 9 semester hours must be writing intensive (WI).

**Bachelor of Science**  
**Major in Geography - Geographic Information Science**  
**Minimum required: 120 semester hours**

The general philosophy of the program stresses the importance of a content-rich background in geography along with principles and techniques of Geographic Information Science: GIS; remote sensing; visualization; cartography; spatial modeling; and quantitative methods. The major in GI Science was developed and structured for positions in local, state, and federal agencies, commercial companies, planning departments, engineering firms, utility companies, and many others. To prepare for GI Science careers, many students perform internships with government agencies or private firms as part of their academic program.

**General Requirements:**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, OR two courses from GEO 1105/1305, 1309,1310, and GEO 2410 & GEO 3301 with grades of "C" or higher.
  - b. Complete 45 or more credit hours with an overall Texas State GPA of at least 2.25.
2. The B.S. degree requires a minimum of 36 semester hours of Geography. The B.S. degree requires at least a 2.50 major GPA for Geography and at least a 2.25 TxSt GPA .
3. Required Core: GEO 2426, 3411, 3416, and 4426. Program Elective Courses- In consultation with an advisor, select from the following courses to complete the requirements: GEO 2420, 2427, 4310, 4324, 4380, 4411, 4412, 4417, 4422, 4427, 4430.
4. Student may select one regional course as a Geography Elective - GEO 3307, 3308, 3309, 3328, 3329, 3332, 3333, 4306, 4328.
5. This major concentration also requires an additional three hours of computer science or three hours of mathematics beyond. (CS 1308 or higher, CIS 1323 or higher, Math 1317 or higher). Does not count toward 36 required geography hours.
6. Students select a minor from the approved list of minors. Various minors may be appropriate depending upon a student's interests and career goals.
7. Texas State requires a minimum of 120 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) minor requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303—Technical writing and 8 hours of modern language (if students completed two years of the same modern language in high school, then no additional courses are required, e) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation, of which 36 hours must be advanced (3000—4000) level courses, and at least 9 semester hours must be writing intensive (WI).

**Bachelor of Science**  
**Major in Geography - Urban and Regional Planning**  
**Minimum required: 120 semester hours**

Planning is a diverse profession, which draws upon fields of knowledge and technical skills closely related to geography. Urban and Regional Planning provides the means to evaluate and facilitate programs that benefit our neighborhoods, communities, cities, and regions. Population growth, economic development, transportation, education, public services, and the environment are a few of the essential factors evaluated by planners. Many of our graduates are employed as planners in Texas, as well as within other states and countries. Others have continued in graduate studies at Texas State or in other programs at the University of Texas or Texas A&M, as well as universities outside Texas.

**General Requirements:**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, OR two courses from GEO 1105/1305, 1309,1310, and GEO 2410 & GEO 3301 with grades of "C" or higher in each course.
  - b. Complete 45 or more credit hours with a cumulative Texas State GPA of at least 2.25.
2. To satisfy graduation requirements, students must have at least a 2.50 Geography major GPA and at least a 2.25 Texas State GPA.
3. Geography Urban and Regional Planning Required Core Courses— GEO 3310, 3320, 4321, 4338.
4. Geography Techniques Course—select at least one of the following courses – GEO 2426, 3411, 3416.
5. Geography Required Electives—select from the following-GEO 2310, 2420, 2427, 3303, 3313, 3321, 3323, 3349, 3353, 3434, 4310, 4313, 4314, 4316, 4336, 4339, 4350, 4380, 4412, and 4430.
6. Student may select one regional course as a Geography Elective - GEO 3307, 3308, 3309, 3328, 3329, 3332, 3333, 4306, 4328.
7. The degree requires that students select a minor from the approved list of minors. Minors may be any approved Texas State minor. Students interested in entering the professional planning field are strongly advised however, to consider a minor in Public Administration, Business Administration, or Construction Technology. Other minors may be appropriate depending on career goals. Plan to discuss choice of minor as well as selection of elective courses with your academic advisor.
8. Texas State requires a minimum of 120 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) minor requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303—Technical writing and 8 hours of modern language (if students completed two years of the same modern language in high school, then no additional courses are required) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation, of which 36 hours must be advanced (3000—4000) level courses, and at least 9 semester hours must be writing intensive (WI).

**Bachelor of Science**  
**Major in Geography - Physical Geography**  
**Minimum required: 120 semester hours**

This major emphasizes the physical science elements of geographical study. Physical Geography prepares students for employment in applied climatology and meteorology, oceanography, geomorphology, resource evaluation, environmental analysis, and areas where an understanding of the complex relationship between nature and society is required. Students considering graduate studies in Physical Geography or any of the earth and atmospheric sciences should select this degree option.

**General Requirements:**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, GEO 2410 & GEO 3301 with grades of "C" or higher in each course.
  - b. Complete 45 or more credit hours with a cumulative Texas State GPA of at least 2.25.
2. To satisfy graduation requirements, students must have at least a 2.50 Geography major GPA and at least a 2.25 Texas State GPA.
3. The BS degree with a major in Physical Geography requires a minimum of 36 hours of Geography:
  - a. Physical Geography Major Required Core Courses– GEO 3305, 3325 and at least two courses from GEO 1105/1305, 3335 and/or 4316.
  - b. Geography Required Techniques Courses (select at least three courses) GEO 2426, 3411, 3416, 4412, 4422, 4430.
  - c. Geography Electives (select at least two) GEO 2310, 2420, 2427, 3321, 3434, 3349, 4310, 4313, 4314, 4325, 4334, 4339, 4350, 4380, 4391.
  - d. Student may select one regional course as a Geography Elective - GEO 3307, 3308, 3309, 3328, 3329, 3332, 3333, 4306, 4328.
4. The degree requires that students select a minor from the approved list of minors. Minors may be any approved Texas State minor. Biology, Chemistry, Computer Science, Geology, Mathematics, or Physics minors are highly recommended to complement your Physical Geography Major. Other minors may be appropriate depending upon your interests and career goals. Discuss possible options with your advisor.
5. Texas State requires a minimum of 120 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) minor requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303–Technical writing and 8 hours of modern language [if students completed two years of the same modern language in high school, then no additional courses are required, e) additional elective courses, as needed, to achieve the minimum 120 hours required for graduation, of which 36 hours must be advanced (3000–4000) level courses, and at least 9 semester hours must be writing intensive (WI).

**Bachelor of Science**  
**Major in Geography - Water Studies**  
**Minimum required: 120 semester hours**

The Water Studies concentration provides a focused study of the physical, chemical, social, political, and economic factors of water resources from the geographic perspective. As water resources become ever more critical to the nation, and in particular Texas and the Southwest Borderlands, this degree program addresses the increasing need for professionals in this crucial field. Graduates are highly sought after by government agencies, from local, state to federal, industries that have large water demands, agricultural interests and private consulting firms that specialize in water resource issues. The Lower Colorado River Authority, the Guadalupe-Blanco River Authority, the Edwards Aquifer Authority, and the San Antonio Water System all employ graduates of the program.

**General Requirements**

1. All majors must satisfy the pre-major requirements:
  - a. Complete GEO 1309 or GEO 1310, GEO 2410 & GEO 3301 with grades of "C" or higher in each course.
  - b. Complete 45 or more credit hours with a cumulative Texas State GPA of at least 2.25.
2. To satisfy graduation requirements, students must have at least a 2.50 Geography major GPA and at least a 2.25 Texas State GPA.
3. The BS degree with a major in Water Studies requires a minimum of 36 hours of Geography:
  - a. Water Studies Required Core Courses– GEO 3305, 3434, 4313, 4314, 4325, 4334, 4341.
  - b. Geography Required Techniques Course – select one of the following courses – GEO 2426, 3411, 3416, 4430.
4. The degree requires that students select a minor from the approved list of minors. Minors may be any approved Texas State minor. Biology, Chemistry, Geology, Political Science, Anthropology, Business Administration, Plant and Soil Science or Nature and Heritage Tourism minors are highly recommended to complement your Geography major in Water Studies.
5. Texas State requires a minimum of 120 semester hours of coursework to graduate including: a) general education core requirements; b) major requirements; c) minor requirements d) additional College/degree requirements, which includes either an additional sophomore English literature course or ENG 3303–Technical writing and 8 hours of modern language [if students completed two years of the same modern language in high school, then no additional courses are required] additional elective courses, as needed, to achieve the minimum 120 hours required for graduation, of which 36 hours must be advanced (3000–4000) level courses, and at least 9 semester hours must be writing intensive (WI).

## Minor in Geography

Texas State Geography offers a wide range of content courses that can provide distinct career preparation and competitive advantages to many majors. Students pursuing a Geography minor may choose to focus their studies in these areas: Urban Planning and Land Development; Water Studies; Geographic Information Science; Regional International Studies; Physical Geography/Earth Science; Environmental Resource Management; or Cultural Geography and Demographics.

A Geography Minor requires a minimum of 19 semester hours including: (1) GEO 2410 - Physical Geography and (2) One of the following: GEO 1309 - Cultural Geography; GEO 1310 - World Regional Geography; or GEO 3303 - Economic Geography, for a total of 7 semester hours. (3) Students complete 12 hours of Geography electives of which 9 hours must be at the advanced (3000-4000) level. Minors are encouraged to consult with a Geography Department Academic Advisor to select courses to design the Geography minor.

## Minor in Geology

Geology is the science and study of the solid matter of the Earth, its composition, structure, physical properties, history, and the processes that shape it. A geology minor is an ideal complement to a number of majors in the natural, social, and applied sciences.

A minor in geology requires 19 hours, including GEOL 1410, 1420, 2410, and seven hours chosen from ANTH 3375W; GEO 3325, 4325; GEOL 3400, 3410, 3430, 3440, 4121, 4320, 4330, or 4421.

## Minor in Nature and Heritage Tourism

Nature and Heritage Tourism is the most rapidly growing segment of the overall tourism industry. The minor in Nature and Heritage Tourism concentrates on planning, development and management of nature and heritage tourism activities that have a strong learning content. A minor in Nature and Heritage Tourism requires a minimum of 24 semester hours of coursework including 6 hours of core courses: NHT 4301 and NHT 4302, and 18 hours (from at least two departments outside of the student's major department) selected from: ACC 2361, 2362; AG 3318, 3321, 3351, 3355, 3426, 3427, 4383; ANTH 2415, 3314, 3315, 3334, 3332, 3345, 3347, 3375, 4630; BIO 4322, 4305, 4410, 4415, 4416, 4420, 4421, 4422, 4423, 4434; ENG 3309, 3340G, 3345, 3346, 4325, GEO 2410, 3313, 3329, 3340, 4322, 4336, MKT 3343; PFW 1150H, 1190A, 1200, 2101, 1204, 1225; REC 1310, 1330, 3340, 3351, 4318, 4337; POSI 3328, 4322, 4322, 4361; or SOCI 3340, 3366, 3375.

## Certificate in Environmental Interpretation

The Certificate in Environmental Interpretation is intended to provide a relevant background to prepare students to work as interpretive guides in park and other tourism venues and work in the professional areas of public information/education in resource management agencies.

Applicants to the Environmental Interpretation Certificate program will be required to meet the following criteria:

- Texas State University Undergraduate degree seeking or post-baccalaureate student in good standing.

- Minimum grade in all required/prescribed electives courses of at least a "C."
- Minimum cumulative GPA in all required/prescribed electives courses of a GPA of at least 2.5/4.0.

The application packet will consist of the following materials:

Certificate application form, Transcripts

Required courses include: GEO 4322, and 12 hours from: GEO 2410, 3313, 3325, 4313, 4316, and 4393 (cultural ecology).

## Certificate in Geographic Information Systems

The Texas State Department of Geographic Information Systems Certificate provides the recipient with a working knowledge Geographic Information Systems (GIS) in sufficient detail that they are prepared for professional positions involving the theoretical and applied aspects of implementing and administering a Geographic Information System.

To the prospective employer, the certificate is a professional endorsement that the recipient has received four university level courses on issues fundamental to the design, implementation, and management of Geographic Information Systems. A formal certificate issued by the Texas State's College of Liberal Arts and a statement on the recipient's Texas State transcript recognize successful completion of the program.

Requirements for Certificate - Student must complete GEO 2426, GEO 2427 or 3411 or 3416, GEO 4426 & GEO 4427 with no grade less than a "C" and an overall average for the four classes of at least a 2.5. Please note that GEO 4426 and 4427 do not count toward the 36 hours required for majors in Physical Geography, Resource and Environmental Studies, Urban and Regional Planning, or Water Studies.

For additional information and application process, discuss with an academic advisor or refer to [www.geo.txstate.edu/programs/certificate/gis/index.html](http://www.geo.txstate.edu/programs/certificate/gis/index.html).

## Certificate in Water Resources Policy

The Texas State Department of Geography Water Policy Certificate provides the recipient with a working knowledge of water resources in sufficient detail that they are prepared for professional positions involving water resources management and policy. To the prospective employer, the certificate is a professional endorsement that the recipient has received four university level courses on issues fundamental to water resources management and policy. A formal certificate issued by the Texas State's College of Liberal Arts and a statement on the recipient's Texas State transcript recognize successful completion of the program.

Requirements for Certificate - Student must complete GEO 3434, GEO 4313, GEO 4314 & GEO 4341 with no grade less than a "C" and an overall average for the four classes of at least a 2.5. Please note that GEO 4426 and 4427 do not count toward the 36 hours required for majors in Physical Geography, Resource and Environmental Studies, Urban and Regional Planning, or Water Studies.



For additional information and application process, discuss with an academic advisor or refer to: [www.geo.txstate.edu/programs/certificate/water/index.html](http://www.geo.txstate.edu/programs/certificate/water/index.html).

### Courses in Geography (GEO)

- 1105 (GEOL 1147) Meteorology Laboratory. (0-2) Laboratory observations, calculations, and exercises of meteorological data and phenomena. Prerequisite or corequisite: GEO 1305, Meteorology.
- 1305 (GEOL 1347) Meteorology. (3-0) An introduction to atmospheric science providing information on the properties of the atmosphere, the scientific principles that govern weather and climate, and interactions between the atmosphere and the other components of the Earth system.
- 1309 (GEOG 1302) Introduction to Cultural Geography. (3-0) This course introduces students to the geographical perspective and focuses on spatial distributions of human activities and investigates underlying geographical processes that account for present and past cultural patterns such as population, folk and popular culture, language, religion, gender, ethnicity, politics, urban and rural land use, and economic development. (MC)
- 1310 (GEOG 1303) World Geography. (3-0) This course stresses the similarities and differences of the major world regions. Emphasis is given to human behavior in a spatial context. (MC)
- 2310 Introduction to Environmental Geography. (3-0) Introduces the Geographic perspective to examine the Earth's environment and its opportunities, constraints, and risks, Principles of scale space, and distributions will be used in examining the environment.
- 2410 Introduction to Physical Geography. (3-2) A systematic study of the various elements that make up the Earth's physical environment, weather, climate, vegetation, soil, and landforms. Prerequisite: MATH 1315 or above (excluding MATH 1316) with a grade of "C" or higher.
- 2411 Maps and Society. (2-4) An introduction to map use designed to serve all university thematic topographic, weather, and computer-generated; are surveyed from the points of view of their correct uses and appropriate interpretations. no drafting background or artistic ability needed.
- 2420 Introduction to Geographic Information Techniques. (3-2) The course will introduce the foundations of geographic information systems (GIS), global positioning systems (GPS), remote sensing, cartography, data analysis, and other tools and methods used by geographic information scientists. Maps, data collection, using and creating Internet content, and data analysis and display will be topics in the course.
- 2426 Fundamentals of Geographic Information Systems. (2-4) This course is an introduction to Geographic Information Systems (GIS), a tool for integrating and analyzing spatial data to visualize relationships, seek explanations and develop solutions to pressing problems. The foundations and theory of GIS will be emphasized.
- 2427 Management and Implementation of GIS. (2-4) This course addresses strategies for successful GIS management and implementation in an organization-wide context and is organized around four primary issues: implementation planning, data management, technology assessment, and organizational setting. Prerequisite: GEO 2426 or equivalent.
- 3134 Water Quality Monitoring and Management. (0-3) This course incorporates the water quality training of Texas Watch so students can receive certification and become Texas Watch water quality monitors. In addition, students learn to compile, analyze, and present water quality data for watershed management. May be repeated once for credit. Corequisite or prerequisite: GEO 3434.
- 3301 Quantitative Methods in Geography. (3-0) This course introduces the quantitative methods used by geographers to describe, explain, and predict spatial organization. Course topics include statistical techniques, from summary descriptive measures through simple linear regression, and the utility of statistical software for solving geographic problems. Prerequisite: MATH 1315 or above (excluding MATH 1316) with a grade of "C" or higher.
- 3303 Economic Geography. (3-0) This course investigates the geographic organization of economic activity with emphasis on the interconnections from global to local scales. Technological advances, resource creation and destruction, supply and demand, distribution and development, environmental impacts, and economic justice are addressed. Theoretical models are used to interpret past and current situations. (MC)
- 3305 Climatology. (3-0) Introduction to the elements of climate and their use in environmental monitoring and analysis. Prerequisite: GEO 1305 or 2410 with a grade of "C" or higher.
- 3307 Geography of Europe. (3-0) The course presents a systematic and regional investigation of the physical and cultural processes and phenomena that have created the characteristic landscapes of Europe. Topics include the climate, landform regions, trade, transportation, urban growth, population change, and the evolution of economic integration in the region. (MC)
- 3308 Latin America. (3-0) A regional survey of the physical and cultural geography of Latin America. (MC)
- 3309 United States and Canada. (3-0) This course provides a systematic and regional analysis of the United States and Canada with emphasis on contemporary economic, environmental, political, and social issues. (MC) (WI)
- 3310 Urban Geography. (3-0) The study of city systems, form, and development with emphasis on functional patterns, economic base, industrial location, service, and social area analysis.
- 3313 Natural Resource Use and Planning. (3-0) Problems involved in the use and conservation of natural and agricultural resources.
- 3320 Community and Regional Planning. (3-0) History and development of planning in the United States, organizational and legal frameworks for planning, and an analysis of planning approaches and procedures, particularly within the context of the comprehensive plan. (WI)
- 3321 Energy Resource Management. (3-0) An analysis of energy sources, their distribution and characteristics, and the problems associated with their use and management. (WI)
- 3323 Location Analysis. (3-0) Location and movement stressed in terms of the factors considered in locating industry, business, housing, and community facilities.
- 3325 Geomorphology. (3-0) This course provides a study of landforms, the processes and materials that form them and change them over time. Students will be introduced to bibliographic research and the interpretation of landforms and landscapes in

- the field from photographs or maps. Prerequisite: GEO 2410 or GEOL 1410 or equivalents with a grade of "C" or higher.
- 3328 Geography of North Africa and the Middle East. (3-0) A regional treatment dealing with the physical features and cultural activities of the people in North Africa and the Middle East. (MC)
- 3329 Geography of Texas. (3-0) A physical and cultural geography of Texas with special emphasis on human resources and economic activities. (MC)
- 3332 Geography of South and Southeast Asia. (3-0) This course is a systematic and regional overview of the physical and human geography of the countries of the Indian subcontinent and Southeast Asia. Topics include the monsoons, cultural diversity, rapid economic development, agricultural systems, and environmental problems. (MC) (WI)
- 3333 Geography of China and Japan. (3-0) This course provides a regional overview of the physical and human geography of the countries of East Asia. This course also systematically examines China, Korea, and Japan by closely examining such topics as the impacts of high population densities and intensive land use practices. (MC)
- 3335 Oceanography. (3-0) An introductory course about the physical, chemical, geologic, and biologic characteristics of the oceans and coastal areas. Emphasis will be placed on the role of the oceans as a component of the global environment. Prerequisite: "C" or higher in GEO 2410 or GEOL 1410 or BIO 1320 or BIO 1430.
- 3340 Political Geography. (3-0) Political geography concerns the interrelationship between political activities and spatial distributions. Topics include the concept of the state, international spheres of influence and confrontation, boundaries, contemporary world issues and problems, and geographic aspects of electoral politics. (MC)
- 3349 Population Geography. (3-0) An in-depth study of the spatial distribution and movement of human populations. The course will emphasize current issues and analytical techniques. Topics will include the impact of population growth, spatial diffusion processes, migration trends and theories, explanation of regional demographic differences, and techniques such as population projections. (MC)
- 3351 Geography of Health. (3-0) This course introduces concepts of health, health care, disease, and illness from a geographical perspective. The course will examine how people and societies interact geographically with the environment in ways that result in varying degrees of health. The focus will be on understanding health from the perspective of populations rather than individuals in a geographic context.
- 3353 American Ethnic Geography. (3-0) A geographical analysis of ethnic groups in the United States with emphasis on their settlement patterns, spatial interactions, and current problems. (MC)
- 3411 Maps and Mapmaking. (3-2) An introduction to reference and thematic map use and design. The course introduces basic cartographic mapping techniques for quantitative and qualitative data, teaches about geospatial analysis and interpretation, and enables students to design basic maps. Prerequisite: MATH 1315 or above (excluding MATH 1316) with a grade of "C" or higher.
- 3416 Principles of Remote Sensing. (3-2) Introduction to the acquisition, mensuration, interpretation, and mapping of aerial photographs and satellite images for environmental monitoring and inventorying. Prerequisite: GEO 2410 with a grade of "C" or higher.
- 3434 Water Resources. (3-2) This course analyzes within a geographical perspective, the formation, use, conservation, and management of water resources. The students will develop a working knowledge of the hydrologic, water quality, legal, economic, political, and societal factors that determine water availability, hazards, use, demand, and allocation. Prerequisite: GEO 2410 or equivalent with a grade of "C" or higher.
- 4190 Independent Study. (1-0) Individual study under direct supervision of a professor. May involve field trips. This course may be repeated for credit, but a student may not exceed six hours of credit in Independent Study.
- 4290 Independent Study. (2-0) Individual study under direct supervision of a professor. May involve field trips. This course may be repeated for credit, but a student may not exceed six hours of credit in Independent Study.
- 4306 Geography of the Southwest. (3-0) Though primarily defined by aridity, the southwestern United States is extremely diverse in its environments and its people. This course explores how people have related to this land. This course also examines current issues and future trends in natural resources and cultural processes in the region. (MC)
- 4310 Regional Field Studies. (3-0) Observation, description, and analysis of a geographical environment based upon off-campus study in that environment. May be repeated once, provided the second study is in a different region, for a total of 6 semester hours. (WI)
- 4313 Environmental Management. (3-0) This course provides an analysis of the causes of environmental problems, from local to global scale, and the evaluation of attempts at management and solutions of those problems. Emphasis will be placed on the role that geography can play in environmental degradation and management. Prerequisite: GEO 2410 with a grade of "C" or higher. (WI)
- 4314 River Basin Management. (3-0) The purpose of this course is to study principles and practices of large-scale river basin management. Emphasis is on integrated management of land and water resources, including economic development and environmental protection issues. Prerequisite: GEO 2410 with a grade of "C" or higher. (WI)
- 4316 Landscape Biogeography. (3-0) Investigation of present-day and post-Pleistocene spatial patterns of plants, animals, and biogeographical processes. Human interactions with biogeographical patterns is also addressed, as are methods for reconstructing Holocene patterns of biogeographic distribution. Course to be taught over every other year. Prerequisite: GEO 2410 with a grade of "C" or higher.
- 4321 Planning Methods and Procedures. (3-0) A practical course on the design, analysis, and implementation of planning studies and procedures, with emphasis on methods utilized in planning for housing, community facilities, industry, commerce, and transportation including a discussion of renewal, community development, fund generation, and programming. Prerequisite: Grade of "C" or better in GEO 3320.

- 4322 Interpretive Environmental Geography. (3-0) Students learn principles, themes, and techniques for effective interpretation of environmental information to audiences ranging from park visitors to professional conferences. Interpretive themes are drawn from geographic concepts including the physical and cultural landscapes and cultural ecology. Techniques emphasize effective use of traditional and digital presentation methods. (WI)
- 4325 Fluvial Processes. (3-0) Students analyze modern principles of river processes and forms within a geographical perspective. This course examines the fundamental mechanics of fluvial channels with an emphasis on quantitative geographic evaluation of their processes. The course emphasizes natural scientific perspectives and includes linkages to ecology, engineering, resources management, and policy. Prerequisite: GEO 3325 or 3434 with a grade of "C" or higher.
- 4328 Geography of the Russian Realm. (3-0) This course presents a regional and systematic overview of the physical and human geography of the countries of the former Soviet Union. The course examines in depth issues such as the legacy of the degraded landscape and environmental problems left by decades of Soviet industrialization. (MC) (WI)
- 4334 Groundwater Resources. (3-0) This course examines, within a geographical perspective, the major concepts and principles that control groundwater availability and use. Students will analyze aquifer characteristics that determine their water quantity and quality. Constraints on aquifer use including environmental, economic, societal, and legal factors will be analyzed for optimizing aquifer management and water-use policy. Prerequisite: GEO 3434 with a grade of "C" or higher.
- 4335 Directed Research. (3-0) Individual and group research projects at the advanced level that are not offered in the present curriculum. Permission and project approval must be obtained from the faculty member prior to registration. This course may be repeated for credit, but a student may not exceed six hours of credit in Directed Research.
- 4336 Transportation Systems. (3-0) This course is an examination of the evolution of urban transportation systems, policies, institutions, and methods in the United States. Principles, procedures, and techniques of transportation planning in the State of Texas are covered and students are introduced to the literature in transportation geography and methods of transportation analysis.
- 4338 Land Use Planning. (3-0) A study of the patterns, characteristics, and impacts of land use at the local and regional levels. Also, how effective management through the use of such planning tools as the comprehensive plan, capital improvements, programming, subdivision regulations, and zoning influences the utility of land.
- 4339 Environmental Hazards. (3-0) Analysis of environmental hazards with respect to human use of the land. Includes geologic hazards and problems caused by floods and meteorological conditions. Prerequisite: GEO 2410 with a grade of "C" or higher.
- 4340 Fundamental Themes in Geography. (3-0) Students will become familiar with the K-12 Geography Texas Essential Knowledge and Skills (TEKS) and the national geography content standards, identify instructional resources and materials, design instructional units, and fully develop grade level appropriate inquiry based lessons and student assessments. (WI)
- 4341 Water Policy. (3-0) This course covers the evolution of water policy from the awareness of issues, through the political and legal process, to the implementation of specific plans, programs, and facilities. Prerequisite: GEO 3434 and 4313 with a grade of "C" or higher.
- 4350 Solid Waste Planning and Management. (3-0) A survey of the methods of solid waste disposal including waste storage, collection, transportation and disposal, and their short-and long-range effects on the environment. A practical course in the planning, implementation, and management of alternate methods of sanitary waste disposal. Prerequisite: GEO 2410 with a grade of "C" or higher.
- 4355 Geography of Crime. (3-0) This course provides understanding of geographical aspects of crime and criminal behavior. Students are exposed to theories and analysis methods and models explaining and predicting crime spatial patterns. Computer exercises give students hands on experience on crime pattern analysis.
- 4380 Internship in Geography. (3-0) On-the-job training in a public or private-sector agency. Students must apply to the department internship director at least six weeks prior to registering for the internship course. This course may be repeated one time for additional internship credit.
- 4390 Independent Study. (3-0) Individual study under direct supervision of a professor. May involve field trips. This course may be repeated for credit, but a student may not exceed six hours of credit in Independent Study.
- 4391 Environmental Geography of the Yellowstone Region. (3-0) Group investigation of the physical and cultural components of the Yellowstone region and its resulting landscape. Emphasis will be on the interaction between physical and cultural systems.
- 4393 Studies in Geography. (3-0) A course that is designed to consider a selected study in geography. Course studies may vary depending on faculty and student interests and may be applied to the appropriate undergraduate geography major. Repeatable once with different emphasis.
- 4411 Advanced Cartographic Design. (2-4) This advanced course in cartography focuses on thematic map design. The objective is to produce a cartographic portfolio of well-designed, professional grade maps. Theoretical concepts and principles will be introduced using practical examples and written assignments. Prerequisite: GEO 3411 with a grade of "C" or higher.
- 4412 Digital Remote Sensing. (3-2) Introduction to the digital image processing of satellite scenes including restoration, enhancement, classification, change detection, and mapping for environmental monitoring and inventorying. Prerequisite: GEO 3416 or equivalent with a grade of "C" or higher. (WI)
- 4417 Digital Terrain Modeling. (3-2) The course focuses on the mapping, transformation, mensuration, visualization, and applications of digital elevation models in Geography. Prerequisite: GEO 3416 or equivalent with a grade of "C" or higher.
- 4422 Web Mapping. (2-4) The course introduces students to modern interactive and dynamic mapping and GIS techniques that allow internet-based cartographic representations of temporal and non-temporal geospatial objects and

phenomena. Prerequisite: GEO 3411 or equivalent with a grade of "C" or higher.

- 4426 Advanced Geographic Information Systems I. (2-4) This course builds on the principles introduced in GEO 2426 and presents an in-depth examination of the technical aspects involved in spatial data handling, analysis, and modeling. Prerequisite: GEO 2426 or equivalent with a grade of "C" or higher.
- 4427 GIS Design and Implementation. (2-4) This course involves students working as a team on a substantive GIS project, which is designed and conducted by the class. Students will develop and demonstrate competence in GIS techniques at the professional level. Prerequisite: GEO 4426 or equivalent with a grade of "C" or higher. Junior or Senior Standing.
- 4430 Field Methods. (2-4) Methods and techniques for observing, measuring, recording, and reporting on geographic phenomena are investigated in this course. Students will learn the use of instruments and materials in the collection of data for mapping and field research in the local area. Prerequisites: GEO 2410 and 3301 or equivalents with a grade of "C" or higher. (WI)

### Courses in Geology (GEOL)

- 1410 (GEOL 1403) Physical Geology. (3-2) The study of materials making up the Earth, the processes that act upon them, and the results of these processes; the development of tools for the interpretation of earth's history and structure, and the major geologic concepts.
- 1420 (GEOL 1404) Historical Geology. (3-2) A continuation of physical geology leading to consideration of the geologic history of the Earth (with special emphasis on North America), the evolution of life, the continents through geologic time and the principles and procedures used in the interpretation of earth history. Prerequisite: GEOL 1410.
- 2410 Mineralogy. (2-6) Study of the crystal systems, physical properties, classification, and hand specimen identification of common rock-forming and ore minerals. One semester of Chemistry recommended. Prerequisites: Chemistry 1141/1341, and "C" or better in GEOL 1410 and 1420.
- 3400 Petrology. (3-3) An introduction to the hand specimen and microscopic study of igneous, sedimentary, and metamorphic rocks. This course includes the origin of mineral assemblages that make up rocks and the environments of formation. Prerequisite: "C" or better in GEOL 2410.
- 3410 Sedimentation and Stratigraphy. (3-3) Principles of the weathering, transportation, deposition, and lithification of sediments. Primary structures and textures of sediments are used to determine environments of deposition. The recognition and classification of strata into stratigraphic units. Prerequisite: GEOL 2410 completed with a grade of "C" or higher.
- 3430 Structural Geology. (3-3) Description, classification, and origin of Earth structures and the stresses involved in their formation. Solution of structural geology problems using analytical geometry, geologic maps, contouring of data, and preparation of cross sections. Prerequisites: GEOL 1410 and 1420 (or equivalents).
- 3440 Paleontology and Biostratigraphy. (3-3) Identification of ancient invertebrate faunas and their applications in reconstruction of paleoenvironments, paleogeography, and the means by which "time" correlations can be effected in

sedimentary strata. Field intensive course, 1 full day in the field per week. Course will be offered alternating summers. Prerequisites: GEOL 1410 and 1420 (or equivalents).

- 4121 Directed Study. (1-0) Independent study of a particular subject area in geology. Specific topic to be discussed and agreed upon prior to registration. May be repeated once with different emphasis and professor for additional credit. Prerequisite: Approval of the instructor.
- 4320 Topics in Field Geology. (1-6) On-site directed investigations of geology in locations remote from campus.
- 4330 Applied Geology. (1-6) Application of practical geologic laboratory and field methods to environmental, engineering, and planning projects. Prerequisites: GEOL 1410 and 1420. (WI)
- 4421 Hydrogeology. (3-3) This course will provide the student with an introduction to the science of hydrogeology, a conceptual and quantitative understanding of groundwater from a geological/ mathematical/ geochemical perspective, and experience with hydrogeology applications. Prerequisites: GEOL 1420 (or equivalent) and a minimum of 3 hours of college-level chemistry. (WI)

### Courses in Nature and Heritage and Tourism (NHT)

- 4301 Planning and Development of Nature and Heritage Tourism. (3-0) This course applies basic planning and development principles to the special issues of nature and heritage tourism. Particular emphasis is placed on locational analysis, site analysis, and planning for sustainable use.
- 4302 Internship in Nature and Heritage Tourism. (0-10) Students will work in private or public sector settings to gain practical experience in the planning, development and management of nature and/or heritage tourism. Internships must be approved by the director of the Center for Nature and Heritage Tourism. Students will be expected to perform at high professional standards and will interpret the internship experience within the context of current literature. Prerequisite: NHT 4301.