GEOL 3402– STRUCTURAL GEOLOGY
SPRING 2023
Course Syllabus

Instructor:	Jesse M. Kelsch, M.S.
Office Hours:	Mon 1-3; Tue 11-1; Wed 12-2 Bb
Office Location:	WSB 316
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Email Address:	jkelsch@sulross.edu
Class Schedule:	MWF 11-11:50
Classroom Location:	WSB 210
Required Textbooks:	Fossen: Structural Geology (any edition) Rowland et al: Structural Analysis & Synthesis
Required free software:	"Stereonet" v.11 by Allmendinger "Strabospot" -install on your computer and smartphone "Google Earth Pro" (the desktop version) "QGIS" v.3.16 or 3.22
Required equipment for field and lab work:	Combination protractor/scale (clear plastic) Hand lens Clip board Grain-size card (clear plastic) 2 to 3 mechanical pencils, 005 or smaller width

Section I. Introduction and Course Objectives

This is a core class in the Geology BS degree undergraduate curriculum. **Prerequisites: Physical Geology; Trigonometry** (Trig may be taken as a corequisite)
The objective of this course is to provide the student with a clear understanding of the features and origins of deformed rocks, including the classification, identification, occurrence, causes and geographic distribution of the common types of rock deformation. This course also intends to verse the student in communicating their interpretation of geologic deformation through the field-standard tools of geologic maps, geologic cross sections, and geologic reports.

Section II. Student Learning Outcomes

The student will be able to apply a diverse body of geologic information in the area of structural geology and tectonics, by throughout the course developing the ability to:

1. Measure and describe orientations of geologic structures
2. Interpret and construct geologic maps and structural cross sections
3. Apply various projection techniques to graphically and geometrically illustrate geologic structures

4. Demonstrate qualitative and quantitative analytical methods in the laboratory and in the field
5. Evaluate and interpret the origin, extent, timing and causes of rock deformation in Earth's crust

Section III. Marketable Skills
The student will be able to conduct geologic field work; to use basic geologic field equipment; and to communicate in written format.

Section IV. Course Design: Communication Infused
To be successful in college and beyond, many sources (e.g., Morrealle & Pearson, 2008) indicate that communication competencies are essential. Sul Ross recognizes that the current generation of undergraduate university students should receive training to navigate a global world as competent communicators in various contexts and channels of communication.

Through our Quality Enhancement Plan (QEP) called *Compass*, Sul Ross aims to equip you to be navigate excellence in the 21st century by developing your communication skills across multiple courses. This geology course has been re-designed to enhance your communication skills. Therefore, this course has the following QEP Student Learning Outcome:

Section V. QEP Student Learning Outcome
QEP SLO: The student will create works that exhibit skill in prepared and purposeful written communication.

Section VI. Course Requirements and Grading

Requirement	Points Possible
Introductory paper review	20
Black Gap trip attendance	20
Black Gap map	40
Black Gap cross section	40
Black Gap report	40
Franklin Mts map	40
Franklin Mts cross section	40
Franklin Mts report	40
Manzano Mts Stereonet	20
Manzano Mts report	40
6 concept sketches 15ea	90
Exam I	80
Exam II	80
Exam III	80
Final Exam	60
Lecture attendance	20
Lab Total	250
Possible Points	**1000**

Grading Scale

Entire Course
A = 895-1000
B = 795-894
C = 695-794
D = 595-694
F = < 595

Section VII. Course Assignments

1. There is one required field trip scheduled for part of this class's work. This trip will entail geologic field work in south Brewster County and will require one night of overnight camping at Stillwell RV Park between the entrances to Black Gap WMA and Big Bend National Park. The "Black Gap" assignment (Section VI) will begin with data collected in the field on these field trips. Products from this field trip are a completed geologic map and geologic cross section along a designated traverse, and a scientific report describing the geology of the mapping area. We will agree on a date for this trip on the first class day.
2. There is a third mapping project that will be accomplished entirely by interpretation of satellite and drone data for the Franklin Mountains, and using the free QGIS program to view and interpret these data. This project will be introduced during the class lecture. See the class schedule for introduction date and due date.
3. As part of this class's focus on developing communication skills, the class will prepare three different geologic reports describing the geologic setting and history of an area on Earth's surface. One is part of the field projects, and two are part of remote-sensing in-class projects. In each case the written report is one of three main deliverables for each project (each including a map, a cross section, and a written report.) This group is a standard means of communication among geologists, and a format and grading rubric will be provided for each component.
4. Another component of this class's required work is preparation of concept sketches to enhance your learning and to develop spatial communication skills. A concept sketch is a single-page, hand-drawn* figure with succinct labels and complete-sentence descriptions. Six of these will be assigned through the semester from lecture. (*The hand-drawing is what enhances your learning.) Examples will be given in class.
5. There will be three section exams through the semester taken during class time. There will also be a comprehensive final exam during final exam week, also to be taken in the classroom. See the semester schedule for dates.

Section VIII. Policies

Attendance. Regular attendance is expected because being in class is the first step to learning structural geology. Class content and instruction is delivered during the class time and is not stored or re-posted. Good attendance is worth 20 points of your final grade. An excused absence is one documented for illness or for planned college events. Attendance will be taken at the beginning of each class time. Students are also expected to arrive to class on time. Lateness and frequent disappearance from class during class time counts as an absence.

Academic Integrity. Students in this class are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. A scholar is expected to be punctual, prepared, and focused; meaningful and pertinent participation is appreciated. Examples of academic dishonesty include but are not limited to: Turning in work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation; collaborating on a course assignment, examination, or quiz when collaboration is forbidden.

Grading. See the "Grading Scale" in Section VI.

Late Work. Students in this class are expected to submit assignments by the posted due date. Late work will be accepted at a rate of 5% off the earned total for each full day after the due date.

Section IX. Notes on University Programs and Services

SRSU Disability Services. SRSU Disability Services. Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. Students seeking accessibility/accommodations services must contact Rebecca Greathouse Wren, LPC-S, SRSU's Accessibility Services Coordinator at 432-837-8203 (please leave a message and we'll get back to you as soon as we can during working hours), or email rebecca.wren@sulross.edu. Our office is located on the first floor of Ferguson Hall (Suite 112), and our mailing address is P.O. Box C-122, SUI Ross State University, Alpine. Texas, 79832.

Technical Support. SRSU 24/7 Blackboard Technical Support: Toll Free: 888.837.6055. Email: blackboardsupport@sulross.edu

SRSU Library Services.
The Bryan Wildenthal Memorial Library in Alpine offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, library.sulross.edu. Off-campus access requires your LoboID and password. Check out materials using your photo ID. Librarians are a tremendous resource for your coursework and can be reached in person, by email (srsulibrary@sulross.edu), or phone (432-837-8123).

Diversity Statement
"I aim to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, socioeconomic class, age, nationality, etc.). I also understand that the crisis of COVID, economic disparity, and health concerns, or even unexpected life events could impact the conditions necessary for you to succeed. My commitment is to be there for you and help you meet the learning objectives of this course. I do this to demonstrate my commitment to you and to the mission of Sul Ross State University to create an inclusive environment and care for the whole student as part of the Sul Ross Familia. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you."

SEMESTER CALENDAR FOR GEOL 3402 (subject to change)

Week	Week of	Lecture topic	Reading	Assignments
1	16-Jan	1. What is structure; detailed structural analysis; review of structures. 2. Basic structures and geometries; strike and dip; lines and planes;	1.1, 1.2, 1.12. 1.13	
2	23-Jan	1. Introduction to Strain. 2. Strain ellipse; orientations of deformation	2.1 - 2.3 - 2.11, 2.24 - 2.29	Concept sketch #1
3	30-Jan	1. Strain analysis	2.13 - 2.17, 3.1, 3.2, boxes 3.1 and 3.2	Introductory paper review.
4	6-Feb	Stress and compression tests; Mohr circles.	2.30, 4.1 - 4.4, 4.7, 6.1, 6.2, 6.7 - 6.9, 7.3-7.6	Concept sketch #2
5	13-Feb	1. Rheology **2. Exam I**		
6	20-Feb	1. Anderson's Theory of faulting. 2. Brittle deformation mechanisms and joints. 2.	5.6 - 5.8; 9.2, box 9.1; 7.1-7.2, 7.8; 8.1-8.3, 8.6	Concept sketch #3
7	27-Feb	Intro to faults		
8	6-Mar	Normal faults result from tensile stress	ch17	Concept sketch #4
9	13-Mar	Spring Break; No classes		
10	20-Mar	1. Thrust faults result from compressive stress 2. Introduction to geologic mapping techniques.	ch16	
11	27-Mar	**1. Exam II.** 2. In-class project: Geologic mapping using satellite data in QGIS		Franklin Mtns QGIS mapping project.
12	3-Apr	Folds; stereographic analysis of folds	ch11-ch12	Concept sketch #5
13	10-Apr	Folds, continued; Strike-slip faults	Ch.18.	
14	17-Apr	Plastic deformation mechanisms and microstructures	10.1-10.6, 14.1-14.2, ch15	Concept sketch #6
15	24-Apr	1. Tectonites and Shear-sense indicators **2. Exam III.**		Manzano Mtns remote project.
16	1-May	Structural geology and regional tectonic studies I	ch21	
	8-May	Structural geology and regional tectonic studies II	revisit reading from ch1	

QEP MAPPED CLASS CARDINAL RUBRIC

Definition

The process of sending, receiving and interpreting messages through written, oral, or nonverbal communication channels to effectively convey information, and/or by which two or more people reach understanding.

Framing Language

Communication is transmitted through a variety of modes (oral, written, or visual). This rubric is specifically designed to evaluate communication in an academic environment to determine that the central message is conveyed, reinforced by multiple supporting materials and purposefully organized. Communication in an academic environment may include: a variety of written works such as academic papers, lab reports, poetry, webpages, personal essays; oral presentations of sufficient length such that a central message is conveyed, supported and purposely organized; visual media, including but not limited to posters, PowerPoints, videos, graphic art, and infographics.

Glossary

The definitions below serve to clarify terms and concepts used in this rubric only.

- Organization: The grouping and sequencing of ideas and supporting material. Organizational patterns supporting effectiveness typically include an introduction, one or more identifiable sections in the body and a conclusion. An organizational pattern should be purposeful and make the content easy to follow. Potential patterns might include a chronological pattern, a problem-solution pattern, or an analysis-of-partspattern.
- Content Development: The ways in which a topic is explored and represented in relation to its audience andpurpose.
- Purpose: The main point/thesis/"bottom line"/"take-away" of a message. A clear purpose is easy to identify. For example, is the message meant to persuade or to inform, to report or to summarize, or to amuse?
- Academic Language: Language supporting the effectiveness of a central message is appropriate to the topic, genre/discipline, audience, is grammatically correct, and clear. Language enhancing the effectiveness may also be vivid, imaginative, andexpressive.
- Supporting Material: In communication, students draw upon sources to extend, develop, define, or shape their ideas. Digital citizenship, the careful consideration of copyright and fair use of images is important. The student considers reliability of communication to include an understanding of accuracy, applicability, currency, liability, and completeness.
- Technique: Execution or performance of communication skills given the mode of communication. For example, in writing, technique may include mechanics and use of style; in oral communication, it may include nonverbal cues and use of voice; in visual works, it may include the use of the medium.

Cardinal Rubric was adapted from the Association of American Colleges and Universities oral communication VALUE rubric, the National Communication Association's Speaking and Listening Competencies for College Students, Texas A&M University's Visual Communication rubric, Otis College of Arts and Design's Fine Arts rubric, Lane Community College Communicating Effectively Rubric, and Stephen F. Austin State University's assessment rubric for Oral and Visual Communication.

QEP MAPPED CLASS CARDINAL RUBRIC

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet formative (cell one) level performance.

	Exemplary	Satisfactory	Developing	Formative
Organization	Organizational pattern is clearly and consistently observable, skillful, and makes the content of the message cohesive.	Organizational pattern is clearly and consistently observable; contains elements of logical development; contains clear transitions; has a recognizable flow of ideas.	Organizational pattern is intermittently observable; lacks organization; it is sometimes disjointed and/or awkward.	Organizational pattern is not observable; has no discernible organizational structure; contains random unconnected elements.
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the topic, conveying understanding or a useful perspective.	Uses appropriate, relevant, and compelling content to explore ideas within the context. It is clear, accurate and appropriate.	Uses appropriate and relevant content to develop and explore ideas but may have inaccuracies or may be unclear at times. Provides limited insight or information.	Uses appropriate and relevant content to develop simple ideas in some parts of the work. May contain misinformation, or may be confusing or misleading.
Purpose	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work. The purpose of the message is clearly conveyed.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context). The purpose of the message can be discerned with some effort.	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions). The purpose of the message is vague or unclear.	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).The purpose of the message is not at all apparent or is missing.
Academic Language	Communication is grammatically correct. Language choices are imaginative, memorable, compelling, and demonstrate constructive knowledge, connects with audience and flows well. Error free.	Communication is grammatically correct. Language choices are thoughtful and generally effective, demonstrate constructive knowledge, connects with audience and flows well. Limited errors.	Grammar occasionally interferes with communication. Language choices are mundane, commonplace, and partially effective. Language is moderately appropriate to audience. Includes some errors.	Errors in grammar and format. Language choices are questionable and minimally effective. Language is not appropriate to audience. Uses language that sometimes impedes meaning.
Supporting Material	Demonstrates skillful use of a variety of supporting material that are high-quality, credible, relevant sources to develop ideas that are appropriate for the intended message or discipline.	Demonstrates consistent use of credible, relevant sources to support ideas that are appropriate for the intended message or discipline. Though limited, it refers to supporting information or analysis, or establishes credibility or authority on the topic. Generally attributes sources as appropriate.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the intended message or discipline. Makes reference to weak/partial supporting information or analysis. Sources are inconsistently attributed.	Demonstrates an attempt to use sources to support ideas but it insufficiently makes reference to information or analysis that minimally supports the intended message or topic. Fails to attribute sources as appropriate.
Technique	Demonstrates exemplary appropriateness and quality of technique for the chosen mode. For example, skillful execution of genre and disciplinary conventions on written works; skillful oral delivery; exemplary craftsmanship of visual works.	Demonstrates appropriateness and quality of technique for the chosen mode. For example, appropriate execution of genre and disciplinary conventions on written works; or, effective oral delivery; or, notable craftsmanship of visual works.	Attempts to demonstrate appropriateness and quality of technique for the chosen mode. For example, follows expectations of execution of genre and disciplinary conventions on written works; satisfactory oral delivery; satisfactory craftsmanship of visual works.	Marginal demonstration of appropriateness and quality of technique for the chosen mode. For example, attempts to execute basic genre and disciplinary conventions on written works; poor oral delivery; poor craftsmanship of visual works.