

Instructor: Dr. Zeynep O. Baran

Email: zeynep.baran@sdsmt.edu

Office: MI building, Room 312

Office hours: Wednesday 1:00-2:30 pm/ Friday 11:30-1:00 pm

Lecture: Tuesday, Thursday 1:00PM - 1:50PM, Electrical Engineering-Physics, Room 254

Required textbooks: (Lectures) Earth Structure: an introduction to structural geology and tectonics, Ben A. van der Pluijm, Stephan Marshak, ISBN 0-393-92467-X

(Laboratory) Structural analysis and synthesis: a laboratory course in structural geology- 3rd edition; Stephen M. Rowland, Ernest M. Duebendorfer, Ilsa M. Schiefelbein. ISBN 978-1-4051-1652-7

Laboratory sessions (MI building, Room 324):

Monday session	Tuesday Session	Thursday Session
1:00-3:50 pm	2:00-4:50 pm	2:00-4:50 pm

Teaching Assistants:

	Email	Office	Office hours
Anthony Gesualdo (Tuesday, Thursday sessions)	anthony.gesualdo@mines.sdsmt.edu	331 A	M/W 9:00-11:00 am
Stephanie Loose (Monday session)	Stephanie.loose@mines.sdsmt.edu	331 C	M/9:00-11:00 am Th/11:00 am-1:00 pm

Welcome to world of "Structures"!

Structural Geology is the study of the nature, mode, magnitude and timing of the deformational structures and their patterns in the Earth's crust. This course aims to provide the knowledge and skills used in identification and interpretation of deformational structures at different scale. Basic principles of physics, chemistry, biology, mathematics and earth sciences are applied in construction and interpretation of various structural analyses. Lectures mainly cover the temporal and spatial analysis of structures; kinematics and mechanics of the deformation; significance of rheology on rock deformation and various examples of end-members. Laboratory sessions are designed as each lab will follow the related lecture, so you can



apply structural analysis techniques in the lab sessions. Structural analysis techniques you learn in the laboratory sessions will help you to design and conduct scientific and technical research projects in the future.

Main objectives:

- Identification and description of structures on geologic maps, cross-sections, field photos, and rock samples.
- Learning and applying field measurement methods and systematics of data collection
- Improving critical thinking, presentation, and discussion skills by working on different scientific or technical problems individually or as a team.

Observations of micro- to regional-scale structures during the field trips and lab exercises will help you to visualize nature and magnitude of deformation at different scale. Collaborations during the field trips and lab works will increase your ability to work and communicate efficiently with your team members.

The main goal of this course is to help you develop and improve technical and scientific skills through application of structural analyses, while enjoying what you're learning. Achievement of this goal will be much easier with your collaboration. So, please follow these easy steps in this course for success:

- ✓ Read the related chapter and reading material prior to each class, so you can be familiar with terminology and do not get lost during the lecture.
- ✓ After each class period, read and review your lecture notes, lab material, exercises to refresh your knowledge. The more you read and practice lectures and laboratory exercises, the better and faster you will get the concept.
- ✓ Finish each lab assignment during the defined lab period and turn your homework assignment in a timely fashion.
- ✓ Because first lectures will play a key role on understanding proceeding lectures and each lecture will be connected to prior and later lectures, ask your questions before it gets too late! When you don't understand the content or any statement during the class or lab session, do not hesitate to ask your questions to me or your TA.
- ✓ Homework assignments are not group work, unless stated differently. Make an effort to show your own work, so we can help you to catch up if you have missed some important content.
- ✓ Participate in discussions; share your knowledge and observations.
- ✓ **READ and FOLLOW Course requirements and ethics.**

Course Requirements & Ethics

1. Exams

- a. QUIZZES: Differently than previous years, there will be pop-up quizzes *before* or *after* the lecture session or in the lab sessions. Read the assigned chapter prior to coming to the class. There is **no makeup exam** for quizzes. If you don't want to miss these exams, make sure you are not late or not leaving before the end of lectures.
- b. MIDTERM and FINAL EXAMS: There will be **total 3 (three) in-term and 1 (one) final exam for the lecture component of this class**. Final exam will be comprehensive and **cumulative**, including all of the course material covered throughout the semester. Laboratory component has 1 (one) midterm 1 (final) exam. Each exam is designed as you apply laboratory techniques to produce a structural synthesis and its products.

Your final grade will be calculated based on the explained percentiles (refer to Section 9: Grading).

There will be NO make-up exams unless you have an acceptable excuse or unexpected situation (i.e. family emergency, illness) that can be proved by an official document. If you miss an exam due to health problems, an official report from your physician has to be submitted **no later than 1 week** after the missed exam in order to take a makeup exam.

For any other conflicts or problems, you must notify your instructor ahead of time and make arrangements. Any exam or assignment missed without an acceptable excuse will be directly graded as zero (0).

2. Homework assignments

You will be responsible for homework assignments that are prepared to help you understand the content and techniques throughout the semester. Homework assignments must be turned in on or before due date, typed and organized neatly. Late assignments will not be accepted and you will get a zero, unless you have an acceptable excuse and make arrangements with your instructor. Because illegible assignments or illustrations unfairly steal our time while grading, you can lose points for illegible-unorganized assignments or sections.

3. Laboratory assignments

SWITCHING LAB SESSIONS is NOT allowed due to high enrollment number in this course. During the lab session, make sure you have all listed equipment and materials required to complete lab assignments successfully. Your TA will be in charge for explaining the content and problem sets assigned for each lab. They may or not give a short lecture at the beginning of each lab, if needed. Please, do not hesitate to ask your question to them but do not expect full solutions for questions from your TA. Coming to the lab prepared with reading the lab manual is your responsibility.

Lab assignments will due at the beginning of the following lab session. Late assignments will not be accepted and you will directly get a zero, unless you make arrangements with the instructor. Stay in the lab until the end of the lab session and use your time efficiently to get progress with your lab assignment. Persons leaving before the end of the lab session can be considered as absent for the entire lab session.

4. Field trips

We will have field trips to practice structural analysis techniques and help you improve your interpretation skills. Participation in field trips is mandatory. Field trips can be arranged during the weekends. You can participate in field trips ONLY with your registered session, not with other sessions.

You will be responsible for submitting a field trip report for each trip. During the field trips, make sure you measure any primary or deformational structures, record your measurements clearly, define rock units, sketch out important structures, make cross-sections and note your interpretations before you leave the outcrop! Your field trip reports will be graded and contributed to your final grade.

5. Attendance policy:

ATTENDANCE is MANDATORY in this class and its laboratory. Students missing more than ONE Lab session and more than ONE lecture without any acceptable excuse will lose %10 of their final points collected throughout the semester.

“Every student is expected to attend each lecture or laboratory session for which he or she is scheduled. The faculty has allowed no system of authorized “cuts.” A student who fails to attend

classes regularly must satisfy such requirements as the instructor in a course may prescribe.”
(SDSM&T attendance policy)

6. Cheating (Academic Integrity) policy:

COPY & PASTE is considered as Plagiarism/cheating! Do not copy-paste others work in this class. Make sure you give appropriate references in your homework assignments, field reports etc.

“High standards of academic honesty and intellectual integrity are essential to the success of our students and the institution. The campus community will not tolerate acts of dishonesty in any academic activities at School of Mines. Such acts jeopardize not only the individual student, but also the integrity and dignity of the institution and its members. The South Dakota Board of Regents has clearly defined those acts that constitute violations of academic integrity (BOR Policy 3.4.2.B.1). These acts include, but are not limited to, cheating, fraud, plagiarism, or knowingly furnishing false information within the academic arena. These acts of dishonesty violate the ethical values the university works to instill in all members of the campus community....(from SDSMT Academic Integrity policy)

7. Withdrawal Grades Policy and Deadline

Refer to SDSMT Withdrawal grades policy and deadline available online. (South Dakota Board of Regents Policy 5:7.2)

8. Communication and Class Resources:

You can ask your questions at anytime during my office hours or you can request an appointment if you want to meet outside office hours. Please, feel free to email your instructor or TA for your questions. If it is a question that can be answered via the email, we will be happy to help you out. Your TAs are also ready to help you with the content during their office hours. Use appropriate and respectful language while talking with your instructors. Disrespectful and inappropriate language and behaviors are not acceptable in and outside the classroom at any time.

9. GRADING SYSTEM:

- (A) In-term exams (Total 3 exams): 450 points
- (B) Quizzes (x5): 100 points
- (C) Homework Assignments (x6): 540 points
- (D) Final exam: 200 points
- (E) Laboratory Assignments (total 13 lab assignments + field trips): total 1800 points
- (F) Lab Mid-term exam: 150 points
- (G) Lab Final exam: 200 points

$\%50(A) + \%25(B+C) + \%30(D) + \%25(E) + \%30(F+G) = 1000 \text{ points (total points}=\%100)$

Because each grading component has significant contribution to your final grade, so each assignment and exam is important for successful completion of the course.

Important Dates and Deadlines*:

- January 19, 2015 Monday: Martin Luther King day- No Class
- January 22, 2015 Thursday: Homework-1 Stress-strain-Mohr diagrams (100 pts)
- January 29, 2015 Thursday: Homework-1 due date
- February 10, 2015 Tuesday: Homework-2 Rheology- Ductile vs. Brittle deformation (100pts)
- February 12, 2015 Thursday: EXAM-1 (150 pts)
- February 16, 2015 Monday: Presidents Day-No Class
- February 17, 2015 Tuesday: Homework-2 due date
- March 5, 2015 Thursday: Homework-3 Faults, Normal and Thrust faults (140 pts)

March 2-3-5: LAB MIDTERM EXAM (150 pts)
March 19, 2015 Thursday: Homework-3 due date
March 26, 2015 Thursday: EXAM-2 (150 pts)
March 31, 2015 Tuesday: Homework-4 Strike-slip tectonics-Shear zones (100 pts)
Apr 7, 2015 Tuesday: Homework-4 due date
Apr 16, 2015 Thursday: Homework-5 Ductile deformation-Fold Analysis (100 pts)
Apr 23, 2015 Thursday: EXAM-3 (150 pts)
April 28, 2015 Thursday: Homework-5 due date
April 27-28-30: LAB FINAL EXAM (200 pts)
May 8, 2015: LECTURE FINAL EXAM (200 pts)

EXAM CONTENTS:**

Exam I: Stress-strain-deformation mechanisms-Mohr circles-Brittle vs. ductile deformation-Fracture analysis

Exam II: Faults- Normal faults & extensional deformation-Thrust faults and Contractional/compressional tectonics

Exam III: Strike-slip tectonics-Shear zones-Ductile deformation-Folding & Fold analysis

Final Exam: Cumulative (May 8, 2015 12:00-1:50 pm)

Lab Midterm Exam: Strain-stress analysis, Contact relationships, V-rules, cross-sections, three-point problems, thickness-depth calculations, structure contours,

Lab Final Exam: Cumulative→Subjects before the midterm + Fracture and fault analysis, Stereographic projection, rotation problems, fault analysis, fold analysis (dip isogon), shear sense indicators

***/** The dates and exam contents might be subjected to changes by the instructor in order to make up for unexpected schedule changes.**

List of the equipment that will be needed in the labs:

Colored pencils (at least 15 colors)

Ruler (centimeters and inches)

Straightedge

Graph paper

Tracing paper or Mylar

Protractor

Drawing compass

Masking tape

Transparent tape

Thumbtack

Calculator with trigonometric functions