



Course Syllabus: Sedimentology & Stratigraphy

McCoy College of Science, Mathematics, and Engineering

Lecture - GEOS 4534 Section 101

Fall 2022

MWF 9 – 9:50 am | Bolin Hall 125

Laboratory Section

GEOS 4534 Section 11A: W 3 – 4:50 pm | Bolin Hall 125

Contact Information

Instructor: Dr. Steven J. Rosscoe

Office: Bolin Hall 131a

Office hours: MWF 10 – 11 am | T 9 am – 11 am | By Appointment

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Course Description

Analysis of depositional environments based on the physical and chemical formation of sediment, the physics of sediment transport, and post-depositional diagenetic changes. Also includes the study and interpretation of stratified sedimentary rocks, including their identification, description, and modes of origin. Fundamental principles of lithostratigraphic and sequence stratigraphic analysis, mapping, and correlation are also presented.

Course Learning Objectives

The successful completion of this course will be evaluated around the following course learning objectives. Each of these course learning objectives include aspects of both content knowledge and skills development. Students will:

1. Investigate the major processes that dominate sedimentary geology; including weathering, erosion, transport, deposition, and diagenesis.
2. Apply stratigraphic principles for the interpretation of the sedimentary rock record and for the correlation of those rocks around the globe.
3. Develop laboratory and field techniques to apply to the description, identification, and interpretation of sediments, sedimentary rocks, and strata.
4. Develop laboratory, field, and technological skills for the collection, analysis, and presentation of sedimentary data.

Textbook & Instructional Materials

Required Textbook (Used for Lecture and Lab): Boggs, S. 2011. Principles of Sedimentology and Stratigraphy, 5th Edition. Pearson. ISBN: 9780321643186

Materials for Fieldwork (Used for Field Trip):

- Rite in the Rain Field Notebook (Field Pattern Recommended) [Amazon](#)
- Rock Hammer (Rock Pick or Brick Hammer) [Amazon](#)
- Metric Measuring Tape (Must Have Metric) [Amazon](#)

Material for Lab Work (Used in Lab):

- Mechanical Pencils (white erasers are best)
- White Eraser Block
- Colored Pencils (at least basic colors but a larger variety is useful)
- Ruler (metric)
- Calculator (scientific or graphing)

Grading

The formal grade for this course is determined by your performance on lecture exams, laboratory activities, participation in course field component and laboratory midterm final exams.

Table 1: Points allocated to each assignment type. For more details see assignment descriptions below.

Assignments (Quantity)	Points
Lecture Examinations (4)	400
Lab Activities (12)	240
Laboratory Midterm (1)	100
Laboratory Final (1)	100
Field Study Project (1)	100
Total Points	940

Table 2: Total points for final grade.

Grade	Points
A	846 and up
B	752 to 845
C	658 to 751
D	564 to 657
F	Less than 564

Lecture Examinations (Online)

During the semester there will be four examinations given online through the D2L course management system (100 points each). These examinations are given at the end of each our major course units. The examinations will consist of 25 multiple choice questions (2 points each) and five essay style questions (10 points each). You will have 120 minutes to complete each examination. Exams will close and auto submit after 120 minutes.

In general, the multiple-choice questions will focus on vocabulary and key concepts while the essay questions will ask you to provide explanations or describe processes, or apply information to solve a problem. Essay questions will require a minimum of ten complete and grammatically correct sentences to earn full credit. Before you take the examination, you will need to print out supplemental materials for use during the examination (stratigraphic sections, problems, etc.).

Exams 1 to 3 will be available for a full week, you can take them when you are best prepared. Exam 4 must be taken on the day of your final exam block. The table below shows the unlock date/time, due date/time, and content for each exam. I will be available, in my office, from 8:00 am – 10:00 am for questions and discussions on the day of the final examination block.

Examination	Unlock Date/Time	Due Date/Time
Exam 1: <u>From Rocks to Sediments</u> Sedimentation, Stratigraphy, Weathering (Ch. 1)	Fri. 9/9 6:00 pm	Fri. 9/16 11:59 pm
Exam 2: <u>Clastic Processes</u> Fluid Flow, Entrainment, Transport, Deposition, Sed. Structures (Ch. 2, 4)	Fri. 9/30 6:00 pm	Fri. 10/7 11:59 pm
Exam 3: <u>Chemical Processes</u> Carbonate, Evaporite, and Organic Deposition, Diagenesis (Ch. 5 to 7)	Fri. 10/21 6:00 pm	Fri. 10/28 11:59 pm
Exam 4: <u>Principles of Stratigraphy</u> Lithostratigraphy, Biostratigraphy, Other Techniques, Applications (Ch. 12 to 16)	Mon. 12/5 12:01 am	Mon 12/5 11:59 pm

Lab Activities (In Class)

The laboratory portion of the course requires the completion of 12 laboratory activities. Most laboratory periods will begin with an introduction of important materials and procedures (usually about a half hour) with a laboratory activity to be completed in the lab. There will typically be questions to be answered after you complete the activity. The lab worksheet and questions are due at the start

of the next laboratory period. Labs will be graded and returned the following week. Each lab is worth 20 points.

Laboratory Midterm (In Class)

The laboratory midterm will cover all content in labs 1-6. It will focus on the identification, description, and interpretation of clastic sediments and sedimentary rocks. The exam will be specimen based. A series of specimens will be supplied with a set of questions that must be answered for each specimen. There will be a period of time where all students rotate through the specimens with a designated amount of time set for each specimen. Following the specimen rotation, you will have the remainder of the laboratory period to go back to any specimens for which you would like more time. The laboratory midterm is worth 100 points.

Laboratory Final (In Class)

The laboratory final examination will cover all content in labs 7-12. It will focus on the identification, description, and identification of carbonate, chemical, and organic sedimentary rocks. It will also address techniques in stratigraphy. You will be provided an examination packet with rock specimens and stratigraphic sections to evaluate and interpret. You will have the entire laboratory period to complete this examination. The laboratory final is worth 100 points.

Field Study Project (Field Trip & Online)

Fieldwork and the associated lab work and presentation of field data and interpretations are the nuts and bolts of the geosciences. Whether you want to be a geochemist, volcanologist, paleontologist, the skills of sedimentary and stratigraphic fieldwork are essential. In this course we will complete one weekend field investigation that will be the basis upon which you will write a comprehensive field report on the stratigraphy of the Middle-Upper Pennsylvanian interval in Palo Pinto County, Texas.

General Field Trip Information:

Dates: November 5th to November 6th, 2022 (Saturday and Sunday)

Where: Mineral Wells, Texas

Camping: Either Possum Kingdom Lake or Lake Mineral Wells State Park

Materials Needed: Tent, sleeping bag/bedroll, weather appropriate clothing, toiletries, Rite in the Rain field notebook, pencil (see instructor if you need assistance with camping gear).

In the field you will create several measured sections and gather an abundance of field data and photographs. You will need to find scientific articles on the strata and read about the geology of the Mineral Wells area using the MSU library resources. You will investigate field specimens that you collect with the skills and techniques learned throughout the semester in the lab. Once completed with your field and lab work you will write a professional, GSA journal of Geology-style article discussing the stratigraphy and depositional

environments of the Middle-Upper Pennsylvanian interval in Mineral Wells. The paper will include a set of required professional illustrations including a localities map, digitally generated annotated measured sections, specimen photographs, annotated photographs, and field sketches. The final paper with illustrations is due on the last day of classes.

Extra Credit (Online)

There is no extra credit for this course. Mastering this material is imperative to functioning as a geologist, no other material or activities can supplement.

Late Work

Most assignments in this course have at least a week of lead time before their due dates. It is your responsibility to complete the assignment before the due date. If you have something that will prevent you from completing the assignment on the day it is due, get it done earlier. No late work will be accepted. Missed labs and examinations may be made up with a legal, paper-documented, excuse. See below for make-up work policy.

Make-Up Work/Tests

For legal, paper-documented, excuses make-ups for labs and examinations can be completed. Discussions cannot be made up; discussions require interaction with your peers in real time. Make-up work should be arranged for in advance wherever possible. The instructor will give you a new deadline that is reasonable for the course timeline. No make-up work will be allowed beyond 10 days past the original deadline.

Instructor Class Policies

The following policies are the policies that are integral for our successful completion of the course and should be read thoroughly. If you have any questions, please see the instructor.

Academic Honesty

Academic dishonesty is considered cheating, collusion, and plagiarism. Any unauthorized assistance during the completion of assignments, using on aids beyond those authorized for an assignment, or the use of other people or services to complete assignments is considered cheating. Working with others in a way that is not authorized by the instructor to complete assignments is considered to be collusion. Plagiarism is the use of another person's materials (by paraphrase or direct quotation) without giving them full and clear acknowledgement. The use of material prepared by another person or agency selling term papers and academic materials is also considered plagiarism.

If a student is caught cheating, colluding, or plagiarizing on any assignment the assignment grade will automatically be a zero. Two or more violations will result in failure of the course.

Classroom Civility and Inclusion

The best environment for learning is an environment where everyone is respected and valued for who they are. In my classroom, we are striving for full inclusion. Anyone using derogatory language toward an individual or group is in violation of this policy and will be asked to leave. We are all here together, learning together, this is not a place for hate of any kind. Be civil, treat each other with respect, and do your best listen to each other in any conversation.

Electronic Devices

Use of electronic devices for taking notes is allowed in my classroom. Recording (audio or video) is not allowed unless approved by the instructor for educational purposes. The use of social media or streaming anything is not an appropriate use of technology during class. If your use of technology in a non-educational way is being disruptive to your peers, you will be asked to leave.

Course Grade and Grade Bumps

In my courses, a grade is earned by accumulating points throughout the semester. The grade you earn in the course is determined by the number of points you earn through the timely completion of assignments. As such, at the end of the semester, there are no grade bumps given out. Do not ask how or if you can be bumped up to the next letter grade, if you haven't earned the points you will not be able to get that grade.

If you believe there to be an error in the calculation of your grade, whether it is on a specific assignment or the whole course feel free to ask me to re-evaluate and double check. I will do so happily. For specific assignments, be prepared to give me specific reasons you feel the grade is wrong (which wrong answer do you think was right, etc.).

Desire-to-Learn (D2L)

Extensive use of the MSU D2L learning management system is required in this course. Each student is expected to be familiar with this program as it provides a primary source of communication regarding assignments, examination materials, and general course information. You can log into [D2L](#) through the MSU Homepage. If you experience difficulties, please contact the technicians listed for the program or contact your instructor.

Computer Requirements

Taking this course involves the completion of all lecture exams, reading quizzes, and discussions in the course learning management system (D2L). This class requires you to have access to a computer (with Internet access) to complete and upload your assignments. It is your responsibility to have (or have access to) a working computer in this class. **Assignments and tests are due by the due date, and personal computer technical difficulties will not be considered a reason for the instructor to allow students extra time to submit assignments, tests, or discussion postings.** Computers are available

on campus in various areas of the buildings as well as the Academic Success Center. **Your computer being down is not an excuse for missing a deadline!!** There are many places to access your class! Our online classes can be accessed from any computer in the world which is connected to the internet. Contact your instructor immediately upon having computer trouble. If you have technical difficulties in the course, there is also a student helpdesk available to you. The college cannot work directly on student computers due to both liability and resource limitations however they are able to help you get connected to our online services. For help, log into [D2L](#).

University Policies and Information

The following information and policies apply to this course. Please read each of these policies and ask your instructor if you have any questions.

Important Dates

Last day for term schedule changes: August 25, 2022

Deadline to file for December graduation: September 26, 2022

Deadline to file for May graduation: October 3, 2022

Last Day to drop with a grade of "W:" October 24, 2022

Attendance

Students are expected to attend all meetings of the classes in which they are enrolled. Although in general students are graded on intellectual effort and performance rather than attendance, absences may lower the student's grade where class attendance and class participation are deemed essential by the faculty member. In those classes where attendance is considered as part of the grade, the instructor should so inform students of the specifics in writing at the beginning of the semester in a syllabus or separate attendance policy statement. An instructor who has an attendance policy must keep records on a daily basis. The instructor must give the student a verbal or written warning prior to being dropped from the class. Instructor's records will stand as evidence of absences. A student with excessive absences may be dropped from a course by the instructor. Any individual faculty member or college has the authority to establish an attendance policy, providing the policy is in accordance with the General University Policies.

Change of Schedule

A student dropping a course (but not withdrawing from the University) within the first 12 class days of a regular semester or the first four class days of a summer semester is eligible for a 100% refund of applicable tuition and fees. Dates are published in the Schedule of Classes each semester.

Refund and Repayment Policy

A student who withdraws or is administratively withdrawn from Midwestern State University (MSU) may be eligible to receive a refund for all or a portion of the tuition, fees and room/board charges that were paid to MSU for the semester.

HOWEVER, if the student received financial aid (federal/state/institutional grants, loans and/or scholarships), all or a portion of the refund may be returned to the financial aid programs. As described below, two formulas (federal and state) exist in determining the amount of the refund. (Examples of each refund calculation will be made available upon request).

Services for Students with Disabilities

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, Midwestern State University endeavors to make reasonable accommodations to ensure equal opportunity for qualified persons with disabilities to participate in all educational, social, and recreational programs and activities. After notification of acceptance, students requiring accommodations should make application for such assistance through Disability Support Services, located in the Clark Student Center, Room 168, (940) 397-4140. Current documentation of a disability will be required in order to provide appropriate services, and each request will be individually reviewed. For more details, please go to [Disability Support Services](#).

Campus Carry Rules/Policies

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. The new Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit [Campus Carry Rules and Policies](#)

Active Shooter

The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit [Safety / Emergency Procedures](#).

Smoking/Tobacco Policy

College policy strictly prohibits the use of tobacco products in any building owned or operated by MSU. Adult students may smoke only in the outside designated-smoking areas at each location.

Alcohol and Drug Policy

To comply with the Drug Free Schools and Communities Act of 1989 and subsequent amendments, students and employees of Midwestern State are informed that strictly enforced policies are in place which prohibits the unlawful possession, use or distribution of any illicit drugs, including alcohol, on university property or as part of any university-sponsored activity. Students and employees

are also subject to all applicable legal sanctions under local, state and federal law for any offenses involving illicit drugs on University property or at University-sponsored activities.

Grade Appeal Process

Following the appropriate procedure for grade appeals requires you to speak to your instructor first, so talk to your instructor. Students who wish to appeal a grade should consult the Midwestern State University [Undergraduate Catalog](#).

Course Schedule

Notice: Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor. Labs are due one week after the lab period (Wednesday at the start of the next laboratory period).

Week	Monday	Wednesday	Friday
<u>Week 1</u> 8/22 to 8/26	Introduction <i>Boggs Ch. 1</i>	Sedimentation <i>Boggs Ch. 1</i>	Stratigraphy <i>Boggs Ch. 1</i>
	<u>Lab 01</u> – Review of Basic Concepts of Sedimentary Geology <i>No Reading</i>		
<u>Week 2</u> 8/29 to 9/2	Sources of Sediment <i>Boggs Ch. 1</i>	Physical Weathering <i>Boggs Ch. 1</i>	Physical Weathering <i>Boggs Ch. 1</i>
	<u>Lab 02</u> – Qualitative Sedimentary Textures <i>Boggs Ch. 3</i>		
<u>Week 3</u> 9/5 to 9/9	No Class Labor Day	Chem. Weathering <i>Boggs Ch. 1</i>	Chem. Weathering <i>Boggs Ch. 1</i>
	<u>Lab 03</u> – Quantitative Sedimentary Textures <i>Boggs Ch. 3</i>		
<u>Week 4</u> 9/12 to 9/16	Fluid Flow <i>Boggs Ch. 2</i>	Fluid Flow <i>Boggs Ch. 2</i>	Entrainment <i>Boggs Ch. 2</i>
	<u>Lab 04</u> – Conglomerates <i>Boggs Ch. 5, 8</i>		
<u>Week 5</u> 9/19 to 9/23	Grain Movement <i>Boggs Ch. 2</i>	Grain Movement <i>Boggs Ch. 2</i>	Deposition <i>Boggs Ch. 2</i>
	<u>Lab 05</u> – Sandstones <i>Boggs Ch. 5, 8, 9</i>		
<u>Week 6</u> 9/26 to 9/30	1° Sed. Struct. <i>Boggs Ch. 4</i>	Paleocurrent <i>Boggs Ch. 4</i>	2° Sed. Struct. <i>Boggs Ch. 4</i>
	<u>Lab 06</u> – Mudstones <i>Boggs Ch. 5, 8, 9, 10</i>		
<u>Week 7</u> 10/3 to 10/7	Carbonate Minerals <i>Boggs Ch. 6</i>	Carbonate Dep. <i>Boggs Ch. 6</i>	Biogenic Carbonate <i>Boggs Ch. 6</i>
	Lab Midterm – Clastic Sediments and Sedimentary Rocks		
<u>Week 8</u> 10/10 to 10/14	Evaporite Minerals <i>Boggs Ch. 7</i>	Evaporite Processes <i>Boggs Ch. 7</i>	Organic Processes <i>Boggs Ch. 7</i>
	<u>Lab 07</u> – Carbonates I <i>Boggs Ch. 7, 11</i>		
<u>Week 9</u> 10/17 to 10/21	Diagenesis <i>Boggs Ch. 5-7</i>	Diagenesis <i>Boggs Ch. 5-7</i>	Diagenesis <i>Boggs Ch. 5-7</i>
	<u>Lab 08</u> – Carbonates II <i>Boggs Ch. 7-11</i>		

Course Schedule Continued

Notice: Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor. Labs are due one week after the lab period (Wednesday at the start of the next laboratory period).

Week	Monday	Wednesday	Friday
Week 10 10/24 to 10/28	Strat. Successions <i>Boggs Ch. 12</i>	Lithostratigraphy <i>Boggs Ch. 12, 13</i>	Lithofacies <i>Boggs Ch. 12, 13</i>
	<u>Lab 09</u> – Chemical Sedimentary Rocks <i>Boggs Ch. 7-11</i>		
Week 11 10/31 to 11/4	Faunal Succession <i>Boggs Ch. 14</i>	Radiation/Extinction <i>Boggs Ch. 14</i>	Biozonation <i>Boggs Ch. 14</i>
	<u>Lab 10</u> – Measured Sections <i>Boggs Ch. 12</i>		
Week 12 11/7 to 11/11	Magnetostrat. <i>Boggs Ch. 13</i>	Chronostrat. <i>Boggs Ch. 15</i>	Event Stratigraphy <i>Boggs Ch. 13</i>
	<u>Lab 11</u> – Correlation I <i>Boggs Ch. 12-14</i>		
Week 13 11/14 to 11/18	Cyclostratigraphy <i>Boggs Ch. 13</i>	Sequences <i>Boggs Ch. 13</i>	Parasequences <i>Boggs Ch. 13</i>
	<u>Lab 12</u> – Sequence Stratigraphy <i>Boggs Ch. 13</i>		
Week 14 11/21 to 11/25	Sequence Hierarchy <i>Boggs Ch. 13</i>	No Class <i>Thanksgiving</i>	No Class <i>Thanksgiving</i>
	No Lab <i>Thanksgiving</i>		
Week 15 11/28 to 12/3	Geologic Time <i>Boggs Ch. 15</i>	Geologic Time <i>Boggs Ch. 15</i>	Other Applications <i>Boggs Ch. 16</i>
	Lab Final – Non-clastic Rocks and Stratigraphy		
Finals 12/5	Final Exam Block: Mon. Dec. 5, 8:00 am – 10:00 am		

Course Due Dates in Chronological Order

The following table lists the due dates of each assignment in the course.

Due Date	Assignment
W 08/31	Lab 1: Review of Basic Concepts
W 09/07	Lab 2: Qualitative Sedimentary Textures
W 09/14	Lab 3: Quantitative Sedimentary Textures
F 09/16	Examination 1: From Rocks to Sediments
W 09/21	Lab 4: Conglomerates
W 09/28	Lab 5: Sandstones
W 10/05	Lab 6: Mudstones
W 10/05	Laboratory Midterm: Clastic Sediments and Sedimentary Rocks
F 10/07	Examination 2: Clastic Processes
W 10/19	Lab 7: Carbonates I
W 10/26	Lab 8: Carbonates II
F 10/28	Examination 3: Chemical Processes
W 11/02	Lab 9: Chemical Sedimentary Rocks
Sa 11/05	Field Trip: Mineral Wells, Texas
Su 11/06	
W 11/09	Lab 10: Measured Sections
W 11/16	Lab 11: Correlation
W 11/30	Lab 12: Sequence Stratigraphy
W 11/30	Laboratory Final: Non-Clastic Rocks and Stratigraphy
F 12/02	Field Study Paper
M 12/05	Examination 4: Principles of Stratigraphy