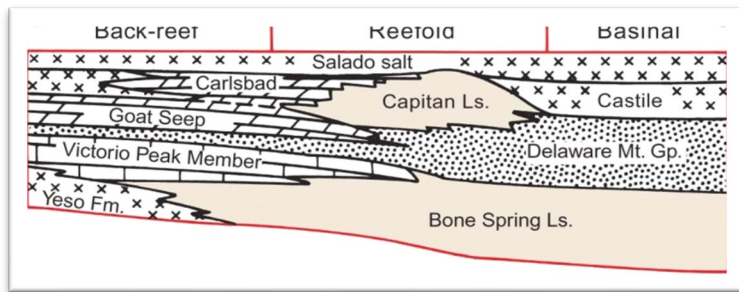


## GEOL 3402: SEDIMENTOLOGY, FALL 2021, revised 10/3/21

TR 11:00 – 12:15, Lab: R 2:00 – 4:50



Stratigraphy of the Guadalupe Mountains, western Permian basin. San Angelo is on the eastern shelf of the basin (Prothero and Dott, 2009).

### Course Description

Covers the processes that create, deposit, and diagenetically alter sediments, as well as the description of sedimentary rocks and related sedimentary structures. Includes a required field trip.

### Course Delivery Style: On-campus class and lab

*Sedimentology lecture and lab will be run as normal classes taught face-to-face in Vincent 146.* Short videos made by your professor and posted on Blackboard coupled with extensive reading in our two textbooks will introduce terms and basic concepts. We will spend much time in class and lab applying terms and concepts to solve problems.

### Professor: Dr. J.I. "Joe" Satterfield

Office: VIN 122

Office phone: 325-486-6766

Physics and Geosciences Department Office: 325-942-2242

E-mail: [joseph.satterfield@angelo.edu](mailto:joseph.satterfield@angelo.edu)

### On-campus Face-to-face Office hours (meet in my office, VIN 122)

- Tuesday: 2:00 – 5:00 pm
- Wednesday: 8:00 – 12:00 am
- Thursday: 8:00 – 9:00 am
- Or contact me to set up a convenient time to meet

### Required Textbooks

1. Nichols, G., 2009, Sedimentology and Stratigraphy, Second Edition: Wiley-Blackwell, 419 p.
2. Tucker, M.E., 2011, Sedimentary Rocks in the Field: A Practical Guide: Wiley-Blackwell, 275 p.

### Grading

- 10 Weekly Quizzes (10%, 1% each)
- 2 exams (20%, 10% each)
- 1 comprehensive final exam (12%)
- 1 hand-sample quiz over rock and mineral identification and description (10%)
- 11 graded lab projects, including weekend field trip and paper summary, 4.36% each (48% total)
- Each student will schedule a brief individual meeting with Dr. Joe after Exam 1!

## Required Lab and Field Equipment

1. Geology field book (Dr. Joe will order)
2. Hand lens, 10x, for lab and field trips (Bausch & Lomb Hastings Triplet recommended)
3. Grain size template (Dr. Joe will order)

## Schedule (revised 10/3/2021)

Week	Lecture/Discussion Topics, <u>Required Reading for weekly quiz</u>	Labs
I: 8/24, 8/26	Flipgrid introductions Five key sedimentology, stratigraphy Terms (Ch 1, p 1-4) Checklist for Describing Sedimentary Rocks, Graphic logs (Lab Manual (LM), Ch 2, p. 9-23) Applications of this Course to your Future 8/26: Review and discussion, Weekly Quiz 1	1: Review common minerals in sedimentary rocks, grain size templates distributed
II: 8/31, 9/2	Terrigenous Clastic Sediments: Gravel, Sand, Mud (Ch 2, p. 5-24; LM, p. 38-47) Conglomerate, Sandstone Classification (Ch. 2, p. 12-13) Sandstone textures (video: Ch 2, p. 23-26) 9/2: Review and discussion, Weekly Quiz 2	2: Constructing a cross-section and stratigraphic column from geologic map of Big Bend National Park
III: 9/7, 9/9, Mr. Shaw teaches lecture, lab	Sandstone families: (LM, p. 38-43) Mudrocks (Ch 2, p. 21-23; LM, p. 46-47) Minerals, rocks in hand spl., thin section (Ch 2, p. 13-21) Carbonate Rocks: Ingredients (Ch. 3, p. 28-30, 33-34; LM p. 47-51) Common fossils in Carbonate Rocks (video, Ch 3, p. 31-32) No Thursday Quiz!	2: Continued
IV: 9/14, 9/16, Mr. Shaw teaches lecture, lab	Carbonate Classifications (Ch 3, p. 34-35; LM, p. 51-55) Evaporites (Ch 3, p. 36-38; LM, p. 59-62) Primary, Secondary Chert (Ch 3, p. 38, LM, p. 65 -67) Ironstones (Ch 3, p. 38-39; LM, p. 63-65, 67-68) Coals (Ch. 3, p. 40-41, LM, p. 68-69) No Thursday Quiz!	3: Sandstones and conglomerates in hand sample (bring your hand lens)
V: 9/21, 9/23, Mr. Shaw teaches lecture, lab	9/22: Attend WTGS Fall Symposium, Midland (optional) Sedimentary Strs. (Ch 4, p. 51-60, 64-68; LM, p. 105-145) Transport Media (Ch 4, p. 44-45) Grain size and Flow Velocity, Graded Beds (Ch 4, p. 47-50) Mass Flows: Debris Flows, Turbidity Currents, Grain Flows (Ch 4, p. 60-64) No Thursday Quiz!	4: Carbonate rocks in hand sample
VI: 9/28, 9/30	Complete minerals and rocks in thin-section Review carbonate classifications with thin-section photos Discuss Exam format and content Weekly Quiz 3: Carbonate classifications, fossils (Ch 3)	5: Sedimentary Petrography: Introduction to the petrographic microscope
VII: 10/5, 10/7	Facies Model (FM) 1: Aeolian Environments (Ch 8, p. 116-126, Summary: p. 127) 10/7: EXAM 1: Chapters 1 – 4, plus pages in Lab Manual	6: Sieving, grain-size analysis of beach, river, dune samples
VIII: 10/12, 10/14	Approach: Interpreting Dep. Environments (Ch 5, p. 80-86) Sedimentology scientific paper distributed (Lab 9) FM 2: Braided Streams (Ch 9, p. 131-134) FM 3: Meandering Rivers (p. 134-138)	7: Other sedimentary rocks in hand sample

	FM 4: Alluvial Fans (p. 141-146) Review and discussion, Weekly Quiz 4	
IX: 10/19, 10/21	FM 5: Deltas (Ch 12) Delta Environments and Successions (p. 182-184) River-, Wave-, and Tide-Dominated Deltas (p. 190-197) Gilbert Deltas, Deep-water Deltas (p. 186, 188-190) Recognition of Deltaic Deposits (p. 196-198) 10/14: Review and discussion, Weekly Quiz 6, and Field Trip to Engineering Lab Flume (Dr. Pinyon)	8: Sedimentology paper discussion  LAB 9 PAPER SUMMARY DUE
X: 10/26, 10/28	Carbonate and Evaporite Environments (Ch 15) FM 6 Carbonate Platforms and Reefs (p. 225-228, 233-242) FM 7: Sabkha, Lagoon evaporites (p. 229-232) 10/21: Review and discussion, Weekly Quiz 7	9: Cretaceous measured section, Water Valley HW 2106 Road Cut, Day 1
XI: 11/2, 11/4	Deep Marine Environments (Ch 16) FM 8: Submarine Fans (p. 250-256) FM 9: Pelagic Sediments (p. 258-260) Recognition of Deep Ocean Deposits, Fossils (p. 261-262) 11/4: Review and discussion before Exam 2	9: Cretaceous measured section, Water Valley HW 2106, Road Cut, Day 2
XII: 11/9, 11/11	11/11: EXAM 2, Facies Models (Ch 9,10,12,13, 15, 16) Post-depositional Structures and Diagenesis (Ch 18) Clastic Diagenesis (p. 285-287) Carbonate Diagenesis, Dolomitization (p. 287-291) Formation and accumulation of Oil and Gas (p. 293-296) Stratigraphic Concepts and Lithostratigraphy (Ch 19) Stratigraphic relationships, especially unconformity types (p. 302-303, 309-310) Lithostratigraphic Units (p. 304-309) 11/11 Weekly Quiz 9: Lithostratigraphy	10: Facies Mapping
XIII: 11/16, 11/18	Biostratigraphy (Ch 20) Principle of Faunal Succession (p. 311-312) Biostratigraphic Zonations (p. 315-316) Controlling Factors (p. 316-318) Taxa used in Biostratigraphy (p. 318-320) 11/18: Fossil review, Weekly Quiz 10: Biostratigraphy	Practice and review for Hand Sample Quiz
XIV: 11/23	Sequence Stratigraphy and Sea Level Change (Ch 23) Sea Level Changes and Sedimentation (p. 348-354) Accommodation Space (p. 354)	Thanksgiving Break: no lab meeting!
XV: 11/30, 12/2	Depositional Sequences and Systems Tracts (p. 357-362, 369, 380) 12/2: Review and discussion before Final Exam	HAND SAMPLE QUIZ: SEDIMENTARY ROCKS AND MINERALS
XVI: 12/7	12/7: 10:30 – 12:30 am FINAL EXAM (comprehensive)	(Lab 11 is a required Weekend Field Trip)

### Course Expectations

1) You will attend every class meeting, unless you are sick. Do NOT come if sick! If you cannot attend, borrow notes from classmate, fill in Powerpoint outline with notes from texts, and ask Dr. Joe questions.

- 2) You will take the next big step: let's talk outside of class about almost anything. Topics I like to discuss: geology, hiking and backpacking trails, productive ways of learning geology, racquetball, Lord of the Rings and Dark Tower, future careers, lame jokes, and more.
- 3) You will not distract yourself or others with electronic devices in lecture or lab. *You will put your phone away during class and lab.* During lab, you will step outside the room if you must text or take a call. Penalties: a) Friendly warning for forgetting the first two times, b) After the third time, you will be asked to leave the lab or class.
- 4) Lab projects and class projects submitted after the due date will receive a 10-point deduction! Work cannot be turned in after the lab or assignment is returned to others (professional ethics issues). Exceptions may be made for serious illnesses, injuries, or family emergencies that require missing many classes.

### **Field Trips!**

A weekend field trip project will be your Lab 12. On field trips we will travel in ASU vehicles. Come on both trips! Our tentative schedule:

- Saturday, September 18: Cretaceous Edwards Plateau section, San Angelo to Balmorhea, concluding with a swim at San Solomon Springs, Balmorhea State Park
- Saturday, October 23: Paleozoic section of N Llano uplift, Lake Brownwood spillway, many fossils!

### **Learning Objectives**

1. To study in more detail sedimentary rocks introduced in Physical and Historical Geology, such as how to describe and measure them, how to interpret the ancient environments they formed in, and how to correlate rocks and time across long distances. The geology of sedimentary rocks is the single most important topic to petroleum geologists.
2. To get hands-on experience in describing and interpreting rocks so that you will have a solid background when taking summer field camp, a 5-week field course (GEOL 3600), when working on your own research project (GEOL 4391), when taking geology courses in graduate school, and when employed as a professional geologist or engineer. The ultimate goal: a good working knowledge of how to describe and interpret whatever sedimentary rocks you encounter anywhere in the world. We will emphasize what can be done in the field with outcrops and hand samples.
3. To learn how to use standard geology tools in the field and the classroom. Tools used include: mud logs from oil wells, hand lens, sieves, petrographic microscopes (an introduction), Brunton Compass, and Jacob's Staff.
4. Learning outcomes will be assessed by exams, a lab practical, and graded lab projects

### **Join GEO and the AAPG!**

One of your most rewarding responsibilities as a Geoscience major or minor is the chance to participate in activities of GEO, our organization of geology students at ASU, and the AAPG, the American Association of Petroleum Geologists, an international professional organization. GEO is a Student Chapter of the AAPG. GEO has supper meetings Wednesdays at 7:00 in VIN 139. The last Wednesday of the month we meet together with the San Angelo Geological Society (SGS) and host a significant geology talk by an outside speaker. GEO dues are \$15.00 / semester. AAPG student membership is free! To join AAPG fill out membership application at [AAPG website](#)<sup>1</sup> AAPG membership is a course requirement.

### **Course Webpages**

The [Angelo State Blackboard site](#)<sup>2</sup> contains PowerPoint slides, web links to scenic areas mentioned in class, practice problems, answers to lab assignments, and your official grades.

## Geoscience Careers

See Geoscience BS requirements in the [Angelo State Catalog](#)<sup>3</sup>. A Geoscience Minor requires 18 hours of geology courses. Sedimentology is a requirement for a major and will count towards a minor in Geoscience. Rewarding careers exist for geologists, geophysicists, hydrogeologists, and secondary science teachers. Talk to your professors!

The [US Department of Labor Occupational Handbook](#)<sup>4</sup> contains information on geology careers, salaries, education needed, and future job outlook in geology.

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

**The College of Science and Engineering adheres to the [Statement of Academic Integrity](#)<sup>5</sup>. Late Assignment Policy**

- Late assignments will not be accepted after graded labs returned or key posted. These are ethics issues!
- If quarantined, accommodations will be provided for late work. Please let Dr. Joe know in writing.

## Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university's [Statement of Academic Integrity](#)<sup>6</sup>.

Policy for this course: first offense- zero on exam or assignment, second offense- F in course

## Plagiarism

Plagiarism is a serious topic covered in ASU's Academic Integrity policy in the Student Handbook. Plagiarism is the action or practice of taking someone else's work, idea, etc., and passing it off as one's own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality via Turnitin. Resources to help you understand this policy better are available at the [ASU Writing Center](#)<sup>7</sup>

## Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student's responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at [ADA@angelo.edu](mailto:ADA@angelo.edu). For more information about the application process and requirements, visit the [Student Disability Services website](#).<sup>8</sup> The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dr. Dallas Swafford

Director of Student Disability Services, Office of Student Affairs

325-942-2047

[dallas.swafford@angelo.edu](mailto:dallas.swafford@angelo.edu)

Houston Harte University Center, Room 112

### **Title IX at Angelo State University**

Angelo State University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from sex discrimination of any kind. In accordance with Title VII, Title IX, the Violence Against Women Act (VAWA), the Campus Sexual Violence Elimination Act (SaVE), and other federal and state laws, the University prohibits discrimination based on sex, which includes pregnancy, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination and unwelcome behavior of a sexual nature. The term includes sexual harassment, nonconsensual sexual contact, nonconsensual sexual intercourse, sexual assault, sexual exploitation, stalking, public indecency, interpersonal violence (domestic violence or dating violence), sexual violence, and any other misconduct based on sex.

You are encouraged to report any incidents involving sexual misconduct to the Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator, Michelle Miller, J.D. You may submit reports in the following manner:

Online: [Incident Reporting Form](#)<sup>9</sup>

Face to Face: Mayer Administration Building, Room 210

Phone: 325-942-2022

Email: [michelle.miller@angelo.edu](mailto:michelle.miller@angelo.edu)

Note, as a faculty member at Angelo State, I am a mandatory reporter and must report incidents involving sexual misconduct to the Title IX Coordinator. Should you wish to speak to someone in confidence about an issue, you may contact the University Counseling Center (325-942-2371), the 24-Hour Crisis Helpline (325-486-6345), or the University Health Clinic (325-942-2171).

For more information about resources related to sexual misconduct, Title IX, or Angelo State's policy please visit the [Title IX website](#).<sup>10</sup>

### **Student Absence for Observance of Religious Holy Days**

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See [ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day](#)<sup>11</sup> for more information

### **Incomplete Grade Policy**

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See [ASU Operating Policy 10.11 Grading Procedures](#)<sup>12</sup> for more information.

### **Copyright Policy**

Students officially enrolled in this course should make only one printed copy of the given articles and/or chapters. You are expressly prohibited from distributing or reproducing any portion of course readings in printed or electronic form without written permission from the copyright holders or publishers.

### **General Policies Related to This Course**

All students are required to follow the policies and procedures presented in these documents:

- [Angelo State University Student Handbook](#)<sup>13</sup>

- [Angelo State University Catalog](#)<sup>14</sup>

### Information About COVID-19

Please refer to ASU's [COVID-19 \(Coronavirus\) Updates](#)<sup>15</sup> web page for current information about campus guidelines and safety standards as they relate to the COVID-19 pandemic.

### Modifications to the Syllabus

This syllabus, including grade evaluation and course schedule, is subject to modification on potentially short notice based on developing circumstances.

---

<sup>1</sup> <https://www.aapg.org/>

<sup>2</sup> <https://blackboard.angelo.edu>

<sup>3</sup> <https://www.angelo.edu/catalogs/>

<sup>4</sup> <https://www.bls.gov/ooh/life-physical-and-social-science/print/geoscientists.htm>

<sup>5</sup> <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

<sup>6</sup> <https://www.angelo.edu/student-handbook/community-policies/academic-integrity.php>

<sup>7</sup> [https://www.angelo.edu/dept/writing\\_center/academic\\_honesty.php](https://www.angelo.edu/dept/writing_center/academic_honesty.php)

<sup>8</sup> <https://www.angelo.edu/services/disability-services/>

<sup>9</sup> <https://www.angelo.edu/incident-form>

<sup>10</sup> <https://www.angelo.edu/title-ix>

<sup>11</sup> <https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of>

<sup>12</sup> <https://www.angelo.edu/content/files/14197-op-1011-grading-procedures>

<sup>13</sup> <https://www.angelo.edu/student-handbook/>

<sup>14</sup> <https://www.angelo.edu/catalogs/>

<sup>15</sup> <https://www.angelo.edu/covid-19/>