GEOL 4411 Sedimentation and Stratigraphy
Department of Physical and Environmental Sciences
Spring 2016

A. COURSE INFORMATION
Course number/section: GEOL-4411.001 (lecture), GEOL-4411.101 (lab)
Class meeting time: MW 02:00-03:15 PM (lecture), M 12:00-01:50 PM (lab)
Class location: Lecture, OCNR-255; Lab, CS-226
Course Website: The Island Online (https://iol.tamucc.edu/)

B. INSTRUCTOR INFORMATION
Instructor: Dr. Mark Besonen
Office location: HRI 117
Office hours: M & T 11:00 AM-12:00 PM, W 11:00 AM-2:00 PM
Telephone: x2043
E-mail: mark.besonen@tamucc.edu
Appointments: please arrange by e-mail, or face-to-face before/after class

C. COURSE DESCRIPTION
Catalog Course Description
Composition and origin of sediments and sedimentary rocks. Description and classification of rocks in hand specimen. Principles of stratigraphy, including stratigraphic units and correlation. Facies models for major depositional systems. Field trips.

Extended Course Description
Much of what we know about the Earth’s history (especially at the surface where we live!) has been deduced from sedimentary rocks and deposits. The study of these rocks and deposits is essentially a forensic, detective science in which we make observations and collect evidence to interpret geologic history and past environments at many different temporal and spatial scales. Our goal for the course is to develop your skills at observing, collecting, analyzing, and interpreting sedimentary evidence both in the field and laboratory. Towards the second half of the semester, we’ll trend into topics related to stratigraphy, building on our sedimentology base to understand “bigger picture” dynamics. We’ll also undertake a practical, hands-on project to pull much of our sedimentology and stratigraphy together with a real life example from a local sedimentary environment.
D. PREREQUISITES, COREQUISITES, EXPECTED SKILLS/KNOWLEDGE, AND WEEKLY TIME COMMITMENT

Prerequisites
GEOL 1403, GEOL 1404, GEOL 3411 (may be taken concurrently) and GEOL 3442, or permission of instructor.

Corequisites
SMTE 0094

Expected Skills and Knowledge
There are several expected skills that you should bring to class, and they should already be under your belt if you have taken GEOL 3442 Geomorphology with me. In particular, you should be completely familiar with the style and structure of a basic scientific report like a scientific lab report. You should also have moderate level of skill and fluidity with a computer spreadsheet program like Microsoft Excel or similar. Finally, you should have the basic skills and knowledge that you acquired in your previous geology classes readily available. For example, you should know the basic physical properties of major rock-forming minerals, you should be familiar with how to read a map and collect data from it, you should be completely fluid with basic mathematics and unit conversions, etc. We will continue to develop and refine these skills throughout the semester, but you will need to put them to use immediately; hence, the need to come with these skills already developed to the level specified above.

Weekly Time Commitment for this Class
Regarding the expected weekly time commitment for this class (or any of your classes…), as a guide, for every live contact hour of class you have, you should be putting in about three to four hours of out-of-class time to support the academic endeavor. For this reason, "full-time" status for a student is defined as only 12 credit hours—these 12 live contact hours also suppose a commitment of 36-48 hours of your out-of-class time. As we have five live contact hours each week in GEOL 4411, to do well in this class, it should be clear that a significant out-of-class time commitment is needed.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
Prothero and Schwab (2014) is our main text, and is available at the campus bookstore for purchase. The full reference for this book can be found below. A tentative reading schedule can be found in Section I of this syllabus.


Supplies
A few supplies are needed for this class including a hand lens (10x-14x magnification range), a ruler marked in metric units, colored pencils, a scientific calculator or equivalent phone/tablet app, and a personal computer (or flexibility to use school computer lab facilities).
F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

Our primary goal in this class is to provide you a broad background in sedimentology and stratigraphy, but from a practical point of view. The simple, macro-observable properties of a sedimentary rock (e.g. color, composition, texture, sedimentary structures, flow indicators, stratification style, etc.) provide powerful evidence to interpret past processes and events near the surface of the Earth. This is especially true when these simple characteristics are integrated with an understanding of the vertical sequence, and large scale geometry and distribution of a deposit. We can adjust and refine these interpretations even further with various analytical techniques in the lab. And while there, we can even take our observations down to the microscopic level for additional evidence. Keeping this in mind, by the end of the semester, the successful student will:

1.) be able to identify and classify siliciclastic, biogenic, chemical, and other sedimentary rocks using both “naked eye” and “hand lens”-observable sedimentary characteristics such as texture, composition, and structures;

2.) be able to interpret probable environment(s) of deposition for a given sedimentary rock sample or outcrop using the sedimentary characteristics mentioned in Learning Outcome 1 above;

3.) gain hands-on experience with several basic sedimentological tools and techniques including sediment core retrieval, sediment core logging and description, and grain size analysis related to our University Beach and Mustang Island projects; and furthermore, will be able to suggest additional lab tools and analyses that would help to characterize and interpret other sediment or rock samples;

4.) be able to correlate stratigraphy, prepare basic correlative figures like fence diagrams, and be able to interpret the significance of basic stratigraphic sequences;

5.) feel comfortable with interpreting (or at least making an educated guess at!) the “big picture” geologic history for a region based on the sedimentary record found there; and, finally,

6.) continue to improve and refine professional geological skills, especially critical communication/presentation skills such as scientific report writing, data visualization and analysis using spreadsheets, and basic map and figure preparation using a vector-based, computer illustration program.
G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course includes lecture, laboratory, and field trip components, which are tightly integrated. Lab activities vary ranging from exercises focused on in-class calculations and analyses to hands-on sedimentary rock descriptions and classifications. We have two larger multi-week projects, and the first involves a field trip and sampling mission to University Beach followed by a sieve-based grain size analysis of collected samples. Our second larger multi-week project involves a field trip to Mustang Island where we will extract sediment cores for a subsequent hands-on analysis during the final weeks of the semester. Finally, at the end of the semester, we will take a day-long field trip to the Austin area to examine a sequence of rocks that will provide a fantastic opportunity to pull together many of the concepts we have examined throughout the semester.

It is important to note that though we do have five hours of direct contact time weekly, much communication and discussion will also happen out-of-class in our class Blackboard discussion forum.

H. MAJOR COURSE REQUIREMENTS AND GRADING

The following table indicates the breakdown of your overall class grade.

<table>
<thead>
<tr>
<th>% of FINAL GRADE</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>Mixed class, lab, and field trip assignments and quizzes [throughout entire semester]</td>
</tr>
<tr>
<td>10%</td>
<td>Attendance and participation [throughout entire semester]</td>
</tr>
<tr>
<td>10%</td>
<td>All-day Austin field trip [30 April]</td>
</tr>
<tr>
<td>10%</td>
<td>Hour Exam 1 [17 February]*</td>
</tr>
<tr>
<td>10%</td>
<td>Hour Exam 2 [30 March]*</td>
</tr>
<tr>
<td>10%</td>
<td>Hour Exam 3 [2 May]*</td>
</tr>
<tr>
<td>20%</td>
<td>Mustang Island Project final write-up [11 May, 1:45 PM, by electronic turn-in via Blackboard]</td>
</tr>
</tbody>
</table>

* The hour exams are cumulative, but mostly focused on the material since the previous exam. The exams are scheduled after every 7-8 lecture blocks to keep the amount of material manageable. Material that is included in any aspect of the class (lecture, lab, field trips, Blackboard, etc.) may appear on the exams.

All assignments and activities will be evaluated and assigned grades using the generalized rubric specified in the table below.
Assignments are weighted differently according to the time, effort, and energy involved. Almost all assignments will be turned in electronically (via Blackboard) with the exception of a few that are done in hard copy format. Late assignments will not be accepted.

I. COURSE CONTENT/SCHEDULE

Our tentative schedule is provided in the table below. Though the dates of the lecture material may shift around a bit according to our tempo, the items that are bolded and centered in the “What” column are fixed in time, and they will not move. Lab blocks and field trips are shaded in light gray. Note that to make field trips possible, we will combine the lab and lecture blocks into a single 3.25 hour block that runs from 12:00-3:15 pm.

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>What</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/20</td>
<td>W</td>
<td>class introduction; weathering and origin of sediments</td>
<td>Chaps. 1-2</td>
</tr>
<tr>
<td>1/25</td>
<td>M</td>
<td>Lab #1—Stoke's Law and pipette grain size analysis</td>
<td></td>
</tr>
<tr>
<td>1/25</td>
<td>M</td>
<td>flow regimes and particle E+T+D</td>
<td>Chap. 3</td>
</tr>
<tr>
<td>1/27</td>
<td>W</td>
<td>bedforms, bedding, sedimentary structures</td>
<td>Chap. 4</td>
</tr>
<tr>
<td>2/1</td>
<td>M</td>
<td>Lab #2—Rose diagrams and paleoflow analysis</td>
<td></td>
</tr>
<tr>
<td>2/1</td>
<td>M</td>
<td>siliciclastic sedimentary rocks</td>
<td>Chaps. 5-6</td>
</tr>
<tr>
<td>2/3</td>
<td>W</td>
<td>sedimentary texture and grain size</td>
<td>reread p. 86-96</td>
</tr>
<tr>
<td>2/8</td>
<td>M</td>
<td>Lab #3—Siliciclastic sedimentary rocks</td>
<td></td>
</tr>
<tr>
<td>2/8</td>
<td>M</td>
<td>lithification and diagenesis</td>
<td>Chap. 7</td>
</tr>
<tr>
<td>2/10</td>
<td>W</td>
<td>facies concept intro; alluvial fan and playa systems</td>
<td>p. 135-142</td>
</tr>
<tr>
<td>2/15</td>
<td>M</td>
<td>Lab #4—University Beach grain size analysis part I (field work)</td>
<td>p. 142-152</td>
</tr>
<tr>
<td>2/17</td>
<td>W</td>
<td>fluvial systems</td>
<td></td>
</tr>
<tr>
<td>2/22</td>
<td>M</td>
<td>Lab #5—Siliciclastic sedimentary rocks cont.</td>
<td></td>
</tr>
<tr>
<td>2/22</td>
<td>M</td>
<td>lacustrine systems</td>
<td>p. 152-157</td>
</tr>
<tr>
<td>2/24</td>
<td>W</td>
<td>eolian and glacial systems</td>
<td>p. 157-167</td>
</tr>
</tbody>
</table>
### Course Policies

**Attendance and Participation**

Your attendance (including on-time arrival) and proactive, positive participation in all class-related activities are expected. In fact, I consider these two things so important that they account for 10% of your overall class grade. Woo-hoo, together these are absolutely the easiest assignment of the semester!

Your attendance (including on-time arrival) is critical because we often split up into pre-defined groups for activities. So if you do not attend, or come in late, this throws a wrench in the works for your classmates, and all the planning/arranging I have done. And even though you might do the readings and review class material on your own, it is abundantly clear to me that students who actually attend the lecture and lab sections actually understand and retain the material much better. This latter reason is why I consider attendance so important. I will...
try to take attendance frequently, but depending on circumstance, it may not be possible for every class lecture/lab session. Note that if you are not present when I take attendance, for example, if you arrive late, you will unfortunately be recorded as absent.

If you have a University-approved reason for an absence (for example, you have to travel with an athletic team), it is your responsibility to contact me well ahead of time to make arrangements. And occasionally, we all have emergencies, for example, a death in the family. I am not unreasonable so if something like this happens to you, inform me as soon as possible so we can make appropriate arrangements. Please note that our definitions of “emergency” may vary, and I may not consider your situation an “emergency”.

Your **proactive, positive participation** in all class-related activities is also expected. What do I mean by this? I am talking about things that help us work together as a team so that each of you gets as much out of the class as possible. For example, are you actively engaged and working with your teammates in class and lab, or is somebody else in the group carrying the load? During labs and field trips, workloads are sometimes unequal due to circumstances beyond my control. For example, at University Beach, we will see that some samples are easier to obtain than others. If you end up with an easy sample in such a situation, do you proactively help out your classmates so we can all finish earlier as a class? Similarly, during field trips, do you keep up with the group as we move from spot to spot, and actively help with carrying gear, and making observations and measurements? Do you actively participate and contribute to discussions in class, lab, and especially on Blackboard? When I request information or data from you, for example, from one of our field trips or activities, do you respond in a timely manner, or do I have to keep pestering you to get it? I hope you can see the common theme among these examples—that they will help us work together better as a team so that each of you gets as much out of the class as possible.

**Late Work and Make-up Exams**
Late assignments will not be accepted. Most assignments will be turned in electronically via Blackboard, and when the deadline arrives, the assignment turn-in mechanism disappears so please start your assignment upload processes with plenty of time. Make-up exams will not be given.

**Extra Credit**
Once in a while, I will offer extra credit opportunities for tasks or work that will be of benefit to the whole class. For example, we often collect data in small teams for lab projects, but then pool it together into a larger data set for use by the whole class. So I may request that somebody take charge of organizing and carrying out such a data pooling task. Or I may solicit photos from field trips that will be posted on Blackboard for the benefit of all, for example, to enhance report write-ups. If you are interested in such an opportunity, you should respond immediately as the opportunity will disappear quickly. Also, you must be willing and able to provide the extra effort and flexibility needed to meet crazy short turn-around times like same-day or next-day. These crazy short turn-around times are necessary because report write-ups are usually due one week after they are assigned. So the data must be made available to the class as quickly as possible.

**Cell Phone and Laptop Use**
Please keep cell phones and other gadgets turned off and stowed away. You may use a laptop or tablet computer to take notes, but please refrain from using them for activities that
are NOT class-related (for example, e-mail, web surfing, social networking, etc.).

**Food in Class**

Food and beverages of any type and any form are not permitted in lab settings, and this is a TAMU System-wide policy. Regarding lecture classrooms, please do not bring food to lectures. You may bring a beverage in to lectures provided you consume it discretely.

**Out-of-Class Communication by Blackboard and E-mail**

I will post most public, out-of-class announcements on Blackboard. In fact, you will land on the "Announcements" page every time you log into our course website on Blackboard. I expect you to log into Blackboard regularly (i.e. at least once per day) to keep up to date.

In some cases when time sensitive information is involved, besides only posting on Blackboard, I will also write the class directly by e-mail. TAMUCC ITS can only guarantee e-mail delivery as far as its own e-mail systems (i.e. your islander.tamucc.edu e-mail account). Thus, if you choose to use a different e-mail provider (for example, by forwarding your mail elsewhere like Hotmail.com, Yahoo.com, or Gmail.com), there is a strong possibility that my e-mail to you may be delayed by many hours. Indeed, this frequently happens with Hotmail.com and Yahoo.com e-mail addresses based on my past experience. In some cases, my mail to you may be completely rejected with no warning provided whatsoever. For this reason, if you choose to use an e-mail provider besides TAMUCC ITS, you also accept the responsibility that you may receive my e-mail communications late, or not receive them at all.

**Lecture Slides, Audio Recordings, Other Electronic Resources, and Limitations on Their Use**

Throughout the semester I will make available to you a variety of materials in electronic format such as lecture slides, lecture audio recordings, and other materials. I do this to help you get as much as possible out of the class. However, I explicitly limit these materials to your personal use for the current semester. You may not distribute, disseminate, sell, pass on, upload, post, share, make available, etc. any of this material by any means without my explicit, written permission. Many thanks in advance for respecting these limitations on use.

Regarding lecture slides, I will post PDF files of my slides in two slides per page format on Blackboard before the start of class. Regarding audio recordings of my lectures, I will post them in MP3 format on Blackboard within a few days following each lecture.

**Labs, Field Trips, and Safety**

Lab protocol and safety best practices will be delivered this semester via the mandatory SMTE 0094 Geology Lab Safety Seminar, a corequisite online class that you were required to register for along with this class. You should complete the SMTE 0094 online course BEFORE our first lab session on 25 January.

Though our Monday lab and lecture sections are normally separate, in two cases, we will combine them into a single, 3.25 hour time block. We'll do this for our field trip to Mustang Island, and the subsequent lab analysis of sediment cores the following week.

Regarding field trips, appropriate footgear and attire is critical. Footgear should be comfortable, but secure (like boots or tennis shoes, but not flip-flops, sandals, or similar). You should also dress appropriately for protection from the sun, insects, and vegetation (long
sleeves, pants, hat, sunglasses, sunscreen, etc.). Please do not wear or bring expensive, designer clothes, footwear, handbags, etc., as these are NOT appropriate for a geology field trip in which you can expect to get dirty, wet, muddy, etc.

Whether we stay in the lab or go to the field, your safety during these events is of the utmost importance—even beyond the science! While I don’t expect any unsafe or dangerous situations, use common sense if something unexpected develops, and let me know about it immediately.

Field trips are one of the great things about studying geology, but please keep in mind that our presence off-campus entirely reflects back on the Geology Program and the University as a whole. So things that might be completely innocuous, or “just a joke”, might unfortunately be misinterpreted in a negative way by others if they are observing from afar. Many thanks in advance for helping us to put our best foot forward as a program and a university!

**Academic Honesty and Working Together**

Much of the time you’ll be working together in small groups or teams to observe, brainstorm, analyze, interpret, report, etc. And in many cases, we’ll be sharing the exact same data sets, photos, samples, and other resources. So undoubtedly results will be similar in many cases. However, for any assignments that you are supposed to turn in (for example, lab write-ups, figures and diagrams, reports and papers, other misc. assignments), they should be produced by you *independently*. **Sharing computer files, templates, or similar, at any level of completion, does not count as independent work, and is considered academic dishonesty.** When this occurs, I am obligated to report it, and I will do so. If there is ever a question about what constitutes independent work, or if you can work together or not, simply ask me for clarification, or choose the more conservative option.

**Plagiarism**

The University provides us a tool to help uncover plagiarism, and if I encounter it while reviewing your work, I am obligated to report it. The tool is called Turnitin, and you can read about it at https://distance-education.tamucc.edu/turnitin.html. Explanatory resources about what constitutes plagiarism can be found at many websites, one good source being the http://www.plagiarism.org/ website. Nonetheless, the boundaries are not always perfectly black and white, and so if you have any doubts or reservations, you should take the most conservative approach, or come talk to me for additional guidance. In general, I do not expect this to be an issue because all the reports and write-ups we prepare are almost entirely focused around our own data (i.e. they do not, and should not, require external research).

**K. COLLEGE AND UNIVERSITY POLICIES**

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.
• **Classroom/Professional Behavior**
  Whenever we get together to learn (whether it be in the classroom, the lab, or the field) courtesy, collegiality, and respect for one another are required. If for some reason you feel this is not happening, please, let me know about it, and I’ll try to remedy the situation.

Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website and the College of Science and Engineering Grade Appeals website, respectively, at:

  http://www.tamucc.edu/provost/university_rules/index.html
&

http://sci.tamucc.edu/students/GradeAppeal.html.

For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816, or visit the website at:

  http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. **OTHER INFORMATION**

- **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

M. **GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.