

## GY 402: Sedimentary Petrology (W) - 3 hours

Spring 2017

Your Host: Dr. Doug Haywick (<http://www.southalabama.edu/geology/haywick>)

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**Bulletin Description:** A study of sediments and their classification, as well as sedimentary processes, petrography and diagenesis. Prerequisites: GY 111, GY 112, EH 102, GY 304 or permission of the instructor. Fee.

**Objectives and Goals:** This course will examine the physical make-up of some of the most important rocks we have on the planet (certainly along the Alabama Gulf Coast!); the sedimentary rocks. You will be introduced to the most common nomenclatures used to name those rocks and sediments, the techniques used to identify them, and the parameters responsible for their origins. Laboratories will be used to introduce you to the physical properties of sediment and sedimentary rocks. Several **required** field excursions will take place in this class. The one to Moscow Landing will be a three day mini field school. GY 402 has GY 302 and 304 as prerequisites.

**Class Format:** Web-enhanced; in class and online lectures (Flipped)

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### **TENTATIVE LECTURE & LAB GAME PLAN (Changes in red text)**

#### **Week 1 INTRODUCTION**

Tues [Lect A]: Course structure, origin of sediment, description of sedimentary rocks (1)

[Lect B]: Grain size and descriptive parameters of sediment (2)

Thurs [Activity]: Botanical Gardens walkabout (1.5 hours)

[Lab]: Activity 1; Ternary Plot exercise

*Saturday Jan 14 – Sunday Jan 15, collect samples for your grain size project*

#### **Week 2 GRAIN DYNAMICS**

Tues [Lect]: Fluid and bedform dynamics (3)

[Lab]: Grain size analysis

[Online]: Sediment classification techniques and schemes (4)

Thurs [Lect]: Activity 2: Analysis of sediment/sedimentary rock with a hand lens

[Lab]: Grain size analysis

#### **Week 3 FLUID DYNAMICS**

Tues [Lect]: Bedform development (5)

[Lab]: Grain size analysis

[Online]: Primary sedimentary structures (6)

Thurs [Lect]: Sedimentary sections (7)

[Lab]: Grain size analysis

#### **Week 4 SEDIMENTARY STRUCTURES**

Tues [Lect]: Sedimentary Facies (8)

[Lab]: Grain size analysis

[Online]: Walter's Law (9)

Thurs [Lect]: Siliciclastic petrography 2 [mature sediment] (10)

[Lab]: Activity 3: James' sedimentary section exercise

#### **Week 5 SILICICLASTIC PETROGRAPHY**

Tues [Lect]: Nearshore depositional environments (11) (**midterm exam issued**)

[Lab]: Mature sandstone petrology (quartzarenite)

Thurs [Lect]: Activity 4; Beach paper critical review (reading/writing)

[Lab]: Mature sandstone petrology (quartzarenite)

*Sunday February 12 (9:00 am-5:00 pm): Field trip; Perdido Citronelle Fm ( **Mandatory** )*

#### **Week 6 SILICICLASTIC PETROGRAPHY**

Tues [Lect]: Siliciclastic petrography 2 [immature sediment] (12) (**midterm exam due**)

[Lab]: Immature sandstone petrology (arkose/litharenites)

[Online]: Alluvial fan depositional environments (13)

Thurs [Lect]: Activity 5; Flume activity

[Lab]: Immature sandstone petrology (arkose/litharenites)

**Week 7 SILICICLASTIC PETROGRAPHY**

Tues [Lect]: Siliciclastic diagenesis: matrix versus cement (14)

[Lab]: Siliciclastic diagenesis

Thurs [Lect]: Activity 6; Sediment provenance critical review (reading/writing)

[Lab]: Siliciclastic diagenesis

**Week 8 SILICICLASTIC PETROGRAPHY/MOSCOW LANDING INTRODUCTION**

Tues [Lect]: **Mardi Gras Holiday (February 28)**

[Lab]: **Mardi Gras Holiday**

Thurs [Lect]: Moscow Landing (15)

[Lab]: **Special Lecture: Sedimentary Structures in depositional modelling (Candidate Presentation)**

**Week 9 VOLCANICLASTIC AND CARBONATE PETROGRAPHY**

Tues [Lect]: Volcaniclastic petrography (16)

[Lab]: Volcaniclastic Sandstone Petrology

Thurs [Lect]: Sandy Fluvial Systems (17)

[Lab]: Volcaniclastic Sandstone Petrology

**Week 10 SPRING BEAK (March 13-17)**

**Week 11 CHEMICAL SEDIMENTARY ROCKS**

Tues [Lect]: Non-skeletal allochems (ooids, mud etc) (18)

[Lab]: Carbonate Tidal Flat Petrology

[Online]: Evaporite and carbonate tidal flat petrology (19)

Thurs [Lect]: Skeletal allochems (20)

[Lab]: Carbonate Tidal Flat Petrology

**Week 12 CARBONATE PETROGRAPHY**

Tues [Lect]: Carbonate shelf depositional environments (21)

[Lab]: Limestone Petrology (non-skeletal)

Thurs [Lect]: More skeletal allochems and reefs (22)

[Lab]: Limestone Petrology (non-skeletal)

*Friday March 31 (4:00 PM) – Saturday April 1(9:00 PM): Field trip to Moscow Landing (Mandatory)*

**Week 13 CARBONATE PETROGRAPHY**

Tues [Lect]: Cool water sedimentation and sea-level change (New Zealand) (23)

[Lab]: Limestone Petrology (skeletal)

Thurs [Lect]: Activity 8: 3 minute student presentations (Moscow Landing research)

[Lab]: Limestone Petrology (skeletal)

**Week 14 CARBONATE DIAGENESIS**

Tues [Lect]: Carbonate diagenesis 1 (marine) (24)

[Lab]: Carbonate diagenesis

Thurs [Lect]: Carbonate diagenesis 2 (meteoric) (25)

[Lab]: Carbonate diagenesis

**Week 15 CARBONATE DIAGENESIS**

Tues [Lect]: Carbonate diagenesis 3 (burial) (26)

[Lab]: Carbonate diagenesis

Thurs [Lecture]: Wireline log interpretations (27)

[Lab]: Carbonate diagenesis

**Week 16 ENDGAME**

Tues [Lect/Lab]: Sequence Stratigraphy (28)

Thurs [Lect]: Thin Section Final Exam\*\*

**Tuesday May 2: Final Exam 10:30 am to 12:30 pm**

**Reasonably useful information:**

*Text book (reference):* Walker, R.G., and James, N.P. (eds.), 1992: Facies Models. 3rd Ed. Geosci. Can. Rep. Ser. 1, Toronto.

*Lab Manual:* There is no lab manual required, however, you must have the following for the labs:  
1) hard covered notebook (blank pages)  
2) quality hand lens  
3) good quality pencils (coloured and graphite for drawing), pens and a compass

Assessment:	Participation ☺	05%
	Student Presentation ☺	05%
	Peer review ☺ ☺	05%
	Grain size Group project ☺ ☺	10%
	Perdido Group Project ☺ ☺	05%
	Moscow Landing field trip project ☺ ☺	15%
	Small GSSA writing assignments ☺ ☺ ☺	10% (8+2% cover letters))
	Lab assignments	15%
	Final Lab exam ♣	10%
	Take home Midterm exam ♣	10%
	Final Exam ♣	<u>10%</u>
		100%

*Grading:* A - 90+      B - 80 to 89      C - 70 to 79      D - 60 to 69      F - 59 and below

*Laboratories:* It is up to you to examine the rocks and thin-sections that are assigned in this course and to do all additional laboratory assignments. You may do this during the lab periods and/or outside of normal university hours. A good chunk of your mark in GY 402 will be based upon lab material (lab test, quizzes etc). Spend suitable time in the lab going over the crystallographic models and minerals. Refer to the web page for lab assignment due dates. **I do not give extensions;** labs assignments not turned in on time will not be accepted (**you get an F for that assignment**).

☺ *Participation:* One of the major goals of this class is to stimulate your critical thinking. This is done by me asking specific individuals questions during class (Socratic method) and you **participating** in group activities, field trips and in-class discussions. I will assign you to groups at the beginning of the semester. You all swim (or sink!) together.

☺ *Student Presentation:* Another of the goals of this class is to help you to become effective communicators. Each student will be required to present a 15 summary of one of the online lectures or reading assignments during the semester. You may use my PowerPoint slides if you wish or make up your own. I will give you a sign up sheet to select your presentation date during the first day of class. In addition, pay attention in class during lectures and discussions because you never know when you will be asked a question. I will assess you on how well you respond!

☺ ☺ *Writing Assignments:* GY 402 is a W (Writing-Across-the-Curriculum) class, which means that it is writing intensive. The purpose of W classes is to not only provide you with the opportunity to “write”, but to help you to improve your writing skills. In GY 402, you will be able to write in a number of “styles” that are both useful and relevant to all of the geology professions. These “styles” include: professional letters, cover reports, memos, geological lab reports and the ever popular (but much maligned), sedimentology projects (see the GSSA bleb below). In order to help you develop appropriate writing skills, each of the “W” assignments that you get will be assigned will be “re-doable” following submission and review of a first draft. **See the marking and re-grading policy in the More on W classes pages at the back of this syllabus.** Several of the assignments will also be subjected to peer review whereby your fellow students will provide comments in addition to those provided by the instructor. Remember; the purpose of all this is *to improve and develop your writing skills in geology*. Refer to the class website for due dates and redo dates for each of the assignments.

☺ ☺ ☺ *The GSSA:* You will get occasional small writing assignments based in part upon the following premise: you are employed as sedimentologist with the GSSA, the Geological Survey of South Alabama. Every report that you produce (even boring lab reports) will be considered a company document. As such, unless otherwise stated, it should have an appropriate “cover” (either on letterhead or memo paper), be well written without spelling mistakes/grammatical errors, contain, where necessary, a bibliography of refereed references, and contain adequate reference citations. Your signature and company position should also appear in the appropriate location on the cover letter. Ultimately, in your role with the GSSA, you will be responsible for completing 3 major projects: 1) a group report dealing with sediment grain size on a site somewhere on Dauphin Island; 2) a group project involving production of a composite sedimentary section of Pliocene Citronelle Formation near Perdido Alabama and, 3) a project involving the mapping and interpretation of K/T boundary chalk beds near Moscow Landing Alabama. The

first and last projects will be broken up into a number of components each due at a specific date, and each revisable for re-marking after I or your peers review it for you.

The following will comprise the bulk of the small writing assignments in GY 402:

- Write 1: Breakdown of a term paper (Week 1)
- Write 2: Grain size hypothesis and methods (Week 2; group grade)
- Write 3: Grain size introduction and results write up (Week 4; group grade)
- Write 4: Provenance Paper critical review Assignment (Week 7; Peer reviewed)
- Write 5: Moscow Landing Library Lit Review Assignment (Week 8/9)
- Write 6: Moscow Landing Background/Stratigraphy (Week 11)

In addition, there are in-class activities that we will usually do on an assigned group basis. They are designed to be completable within the assigned lecture/lab period, but I may give you a bit of extra time (e.g., until the next day) to polish off any write ups that might be part of the activity. Most are discussions about assigned reading or previous lectures. Those that will be assessed are:

- Activity 1: Plotting ternary data (requires a calculator) (Week1; group grade)
- Activity 2: Examination of sedimentary rocks with a hand lens (Week 2; group grade)
- Activity 3: James sedimentary section exercise (Week 4; group grade)
- Activity 4: Class critical review of Beaches paper (Week 5; individual grade)
- Activity 5: Flume experimentation (Week 6; group grade)
- Activity 6: Class critical review of provenance paper (Week 7; individual grade)
- Activity 7: Library exercise, Moscow Landing literature review (Week 8; individual grade)
- Activity 8: 3 minute student presentations (Moscow Landing Research) (Week 13; individual grade)

From week 6 until the end of the course, the weekly writing component will largely consist of a short thin section discussion that will be handwritten in your lab note books. Use pencil as these discussions **are re-doable** (however, the thin section descriptions **are not**). All writing assignments (1<sup>st</sup> drafts and revised versions) are **due by 11:00 AM on the assigned due dates** unless otherwise stated. **I will not accept late assignments (you will get an F)**. When I mark them and return them to you with comments, you will be permitted to resubmit them **once** for revised assessment. I will accept revisions up to the re-submission deadlines posted on the web page (usually 1 week later than the original due date).

♣*Exams:* The reason for producing a syllabus is to give students advanced notice of exams and assignment due dates. Translation: there is no excuse for missing an exam. However, sometimes it happens. If you have a **legitimate** excuse for missing an exam (i.e. medical problem), you will be permitted to write a make-up during the last week of classes provided that you show me a signed certificate from a medical doctor stating that it was impossible for you to make the exam. **The make up exam will consist of 2 essay questions** with no choice on your part. The Final lab exam will consist of a thin section and hand specimen description exercise of a sample drawn randomly from a hat. The sample pairs will be from a similar suite to those that you examined during the petrography labs in the class. You will be able to use your lab note books during the final.

*The fine print:* Plagiarism and cheating are not permitted in this class and either of them will result in severe embarrassment to you (and quite possibly an F for the assignment or exam in question) if you are caught doing them. Be sure to use proper reference citations in your take home exam otherwise it's plagiarism. See me if you need help about this **before** the exam.

**Policies related to Student Disability Services, Academic Disruption, Changes in Course Requirements, Student Academic Conduct, and Operational Disruptions are available online on the class SAKAI site accessible through USAonline behind the tab labeled "Additional Academic Course Policies."**

## More on “W” Classes

(Modified from Prof. W. Owen, Past Chair of the WAC Committee)

### Writing Assignments:

This course is designated as a Writing Course (W). This means that a significant portion of your grade will be derived from writing assignments. One of the most important skills of our profession is effective communication. Geologists are expected to communicate clearly with many audiences. The assignments of this course will allow you an opportunity to practice these skills. In all assignments, you should focus on understanding the specific audience so that the writing clearly communicates with them.

### Writing Process:

Clear writing demands good idea organization, correct grammar, punctuation, and spelling. The process of producing clear and concise documents usually requires: (1) pre-planning, research, thought, and organization, (2) writing a draft, (3) a small pause before the editing, and (4) revision(s) to produce the final version. This process can benefit from external proofreading. You might consider having someone else read your draft and assist in the revision process.

The University provides the Writing Center as a service to improve the process of writing. This is not a “proofreading” service; but they can provide advice that can improve your writing. These folks are a valuable asset. You can call and make an appointment with a Writing Center Consultant (460-6480). They are located in 207 Alpha Hall East. Check out their website (URL: [www.southalabama.edu/writing/](http://www.southalabama.edu/writing/)). It has a lot of useful information.

Editing a document that you have written is an “ego” crushing affair. I get out a red pencil and mark my work ruthlessly. I remove excess words and seek better words to make my communication clearer. Allow yourself ample time for this iterative process. Be sure that you use all of the word processing tools at your disposal (spelling, thesaurus, and grammar checkers are helpful).

For these assignments, you should produce a draft, then edit and revise it before submitting it for grading. All assignments, in this class, will be graded and feedback provided (usually in the form of notes written in the margins). You will have an opportunity to reflect upon the comments and revise your submission. However, this writing approach assumes that you have been through the draft and revision phase.

### Formal Peer Reviews:

A process of formal peer review is helpful in producing a document that is well written. In this class, several of the assignments will use a peer review. The function of a peer reviewer is to read a document and make critical remarks that will help to improve it. For example, when reading a section that is confusing, the comment **I do not understand or Unclear??** might help the author identify a section for more work.

As a reviewer, you want to be as specific as possible without re-writing the paper. Peer review focuses upon the meaning and how clearly the author is describing the topic and expanding ideas logically. Remember that style is a personal preference, your style is correct for you and not necessarily for your peer.

Point out obvious errors, point out areas that are awkward or confusing. As a reviewer resist the temptations to: (1) fail to criticize because it is a fellow student, or (2) suggest changes for the sake of making changes the teacher said to.

In this class, you are required to peer review each others work. When reviewing, keep the assignment goals in mind, and make constructive comments. As the author, take the comments as they are intended - “to improve the clarity of your paper.” Prepare two (2) copies of you draft for peer reviewing. Each peer reviewer will complete a peer review form, that will be turned in at the end of the peer review class, as an indication of peer review. Place your initials and data in the margin of the papers you review and return them to the author.

Authors should consider the comments and strengthen the paper before submitting it for grading. It is common to disagree with the reviewer; but remember that an indication of confusion or misunderstanding

from a reviewer means that clear communication is not occurring. Try to improve your writing. Turn in your final draft along with the two peer-reviewed drafts.

**Re-submission Policy:**

In this course you may **resubmit** each assignment once. It is your choice. After the initial grading and feedback, you may choose to re-work your assignment and resubmit for a higher grade. However, you must understand that you cannot expect to boost your grade to a perfect score. Similarly, you should not turn in a paper in need of a lot of work, expect the reviewers to indicate the changes, make them, and expect a huge boost in your grade. **See my official remarking policy in the text box below.**

When turning in a re-submission, you must: (1) clearly mark it as “ **RE-SUBMISSION** on the first page and (2) include the original graded submission. The re-submission will be reviewed and returned as soon as possible.

**Technical Details:**

<u>Margins:</u>	Top	1"	Line Spacing:	Single or 1
	Left	1.5"	Font:	Times (or similar)
	Right	1"	Font Size:	12 point only
	Bottom	1"		

Header: Each page should have the author's name, class name, and page number. Use the wordprocessor to help here

Title: Include a title on the first page that indicates the nature of the assignment. This is NOT a separate sheet of paper!

Paper: 8 ½ x 11 inch, white

Fastening: **Stapled** in upper left corner only - No folders required or wanted. I provide staple for unstapled submissions at the cost of 5 points per staple.

Disk: An electronic copy of your assignment may be required. See the assignment directions for details.

**Marking Policy:**

Quantitatively marking writing assignments is difficult so I will be using a letter grade system. I will mark each assignment according to the following scheme. Please note: there is no such thing as a perfect paper. I do not give out grades of 100% for writing assignments.

Excellent: requires minimal reworking

A+: 95%  
A: 90%

Very Good: requires minor reworking

B+: 85%  
B: 80%

Average: requires substantial reworking

C+: 75%  
C: 70%

Below Average: a complete rewrite is necessary

D+: 65%  
D: 60%  
F: 50%

**Haywick's Regrading Policy**

Re-do grades are limited to a maximum of 10% (one letter grade) above the original grade. For example, if your original grade was C+, the maximum you will get for your re-do grade is a B+ **even if the modified assignment was perfect.** The moral of the story is *do the best job you can on every assignment.*

## D. Haywick Contact Information and Schedule Spring 2017 Semester

*How & where to find Doug:* I reside in LSCB room 049 and welcome any student enquiries during my posted office hours. When you visit, first check the Where's Doug? note on my door. During office hours, if I have to leave my office, I will tell you where I am. If you can, come find me. If the sign confirms that I am in the office, **please knock loudly** and wait for me to get to you. My office is at the back of my lab and it may take me up to a minute to get to the door. Should you be unsuccessful in your attempts to find me, leave a message for me:

**Telephone:** 460-7569 (Haywick's direct office); 460-6381 (Earth Sciences office: **best place to leave a message**)

**e-mail:** [dhaywick@southalabama.edu](mailto:dhaywick@southalabama.edu)

**internet:** <http://www.usouthal.edu/geology/haywick>

Time	Monday	Wednesday	Friday
8:00-9:00 AM		Office	
9:05-10:55 AM		GY 112 lab 103 (LSCB 335)	
11:00 AM – 12:00 PM		Office	
12:20-2:10 PM		GY 112 lab 102 (LSCB 335)	
2:30-5:00 PM		Office	
5:00-6:00 PM			
6:00-8:00 PM			

Time	Tuesday	Thursday
8:00-9:15 AM	Office	Office
9:30-10:45 AM	GY 112-102 (HUMB 160)	GY 112-102 (HUMB 160)
11:00AM-12:15 PM	GY 402 (LSCB 316)	GY 402 (LSCB 316)
12:30-1:45 PM	GY 402 lab 1 (LSCB 337)	GY 402 lab 2 (LSCB 337)
2:00-4:45 PM	Office	Office
5:00-6:00 PM		
6:00-8:00 PM		

Note: grey areas are research\committee\personal times: STAY AWAY!



**Laptops, tablets and smart phones\* may be used during class time for class-related online access, but I would prefer you to keep your attention on me and what I'm saying during lectures because not all of the required content for this class is actually online.**

**\*cell phone calls are NEVER permitted during class/labs**