This course covers the fundamental concepts of sedimentary geology. It consists of twice-weekly classes, weekly laboratories, and four field trips. Students will gain proficiency in sedimentary geology via: (1) conventional lectures with related reading & rote memorization; (2) conventional laboratories with related reading & rote memorization; (3) in-class activities; (4) field data collection & interpretation; (5) laboratory data collection & interpretation; and (6) class, field, & laboratory student presentations.

LEARNING OUTCOMES

Students who successfully complete this course will:

1. Be able to identify, classify and describe the major rocks, minerals, textures and architectures of sedimentary strata as examined in the laboratory and field.
2. Become proficient in the collection of sedimentary and stratigraphic data from field relationships, hand samples, and petrographic observations.
3. Understand the principal mechanisms and settings of sediment deposition and basin formation.
4. Be able to interpret the origin and significance of different stratigraphic architectures and sediment compositions in the context of sediment supply, accommodation, relative sea-level change, subsidence and tectonic setting.
5. Understand and employ methods of reconstructing Earth’s supracrustal history through sediments and sedimentary rocks.
6. Develop skills of inquiry-based learning, and critical thinking.

PROFESSOR

Dave Barbeau. EWS 406, dbarbeau@geol.sc.ed, 803.777.5162
office hours: Tuesday and Friday 1:00 – 2:00 PM.

INSTRUCTIONAL ASSISTANT

Erica Rubino. office: EWS 213 email: erubino@geol.sc.ed, 610.812.0643
office hours: Tuesday 4:30 – 5:30 PM, Thursday 1:45 – 2:45 PM, or by appointment.

GENERAL SCHEDULE

Labs: Monday 3:55 PM – 6:55 PM or Wednesday 10:50 AM – 1:50 PM, EWS 208. You must attend your assigned lab.
Field Trips: Over the course of the semester, there will be field trips that occur outside of the usual lab meeting time. These field trips are mandatory unless advance notice and a university-recognized excuse are provided. Inform your employers, organizations, other profs., etc, now. On overnight trips, we will camp and prepare our own food using departmental equipment. However each student is required to have a sleeping bag, sleeping pad and appropriate clothing. If necessary, all of these can be rented from the Outdoor Recreation Rental Office at the Strom Thurmond Wellness Center for a small fee.
Final Exam: Wednesday, Dec. 9, 9:00 AM, PSC 209.
CLASS CONTENT & SCHEDULE

Class meetings will examine the following topics, generally in the order indicated below. Most topics will be covered in approximately one class meeting, although the rapidity with which we progress through these topics will depend upon student comprehension and interest. As a result, some topics may be accordingly abbreviated or expanded.

The content learned in the earlier parts of the course will form the foundation of later concepts — whereas we will briefly review foundational material when we pursue concepts built upon them, success in this course requires mastery of the foundational material, including basic geology learned in introductory coursework.

Small student groups will make two in-class ‘diagnostics’ presentations, the first on a depositional system, and the second on a sedimentary basin. Those topics are underlined below. The requirements of said presentations will be distributed in advance, and time will be allotted for their preparation during class meetings.

Adjacent to each topic below, you will find the appropriate readings in Prothero & Schwab [third edition, see: REQUIRED RESOURCES]. Topics marked with asterisks (*) will involve supplementary readings distributed electronically. Complete the appropriate readings casually before we reach each topic, and more thoroughly as we progress through them.

Topics
1. Review & Introduction [Chapter 1]
2. Weathering [Chapter 2]
3. Detrital Sediments & Sedimentary Rocks [Chapters 5-7]
5. Other Sediments & Sedimentary Rocks [Chapters 13 & 14]
6. Sediment Transport & Deposition [Chapters 3 & 4]
7. Sedimentary Structures [Chapters 3 & 4]
8. Depositional Systems*
   - glacial [Chapter 8]
   - eolian [Chapter 8]
   - alluvial fan [Chapter 8]
   - fluvial [Chapter 8]
   - lacustrine [Chapter 8]
   - deltaic [Chapter 9]
   - coastal [Chapter 9]
   - shallow marine [Chapters 9 & 12]
   - deep marine [Chapters 10 & 12]
9. Stratigraphy [Chapters 15 & 16]
10. Stratigraphic Architecture [Chapters 15 & 19]
11. Sequence Stratigraphy & Seismic Stratigraphy* [Chapters 17 & 18]
12. Sedimentary Basins* [Chapter 19]
   - rift basins
   - passive margin basins
   - strike-slip basins
   - intracontinental basins
   - trench basins
   - fore-arc basins
   - back-arc basins
   - foreland basins
13. Geochronology in Stratigraphy* [Chapters 17 & 18]
   - U-Pb & Ar-Ar geochronology
   - magnetostratigraphy
14. Chemostratigraphy* [Chapter 17]
   - sediment provenance
   - oxygen & carbon stable isotopes
LABORATORY CONTENT & SCHEDULE

Lab meetings will examine the following topics, on the dates indicated below. Most lab assignments can be completed during lab, although successful preparation for laboratory quizzes and exams will require efforts in the laboratory outside of scheduled meeting times.

Some lab meetings consist of field trips, which are indicated with an asterisk (*). Two of the field trips occur outside of the regularly scheduled meeting times, which are underlined.

Some lab meetings are dedicated to the preparation of student projects, and are not optional.

8/31 & 9/2: Detrital Sedimentary Rocks in Hand Sample
9/14 & 9/16: Carbonate Sedimentary Rocks in Hand Sample
9/19 (or 20): Modern Coastal Depositional Systems*
9/21 & 9/23: Sedimentary Structures
9/28 & 9/30: Modern Fluvial Depositional Systems*
10/5 & 10/7: Sedimentary Petrography
10/12 & 10/14: Lab Exam
10/18 & 10/20: Ancient Sedimentary Rocks II: Appalachian Basin*
10/26 & 10/28: Grain Texture Analysis
11/9 & 11/11: Well Log Analysis & Sequence Stratigraphy
11/16 & 11/18: Appalachian Basin Measured Section Preparation
11/30 & 12/2: Appalachian Basin Measured Section Interpretation

RESOURCES

[Required] Prothero & Schwab’s Sedimentary Geology: An Introduction to Sedimentary Rocks
and Stratigraphy, W.H. Freeman & Co.. Any edition is acceptable, but reading assignment chapters will correspond with the Third Edition.

[Required] Field book: small (~5” x ~7”), rigid, and durable; Clipboard: letter-size, durable.
[Recommended] hand lens, rock hammer.

GRADES

Quizzes: 10%. Includes both Class and Lab content. Expect a quiz every week.
'Diagnostics' Presentations: 5% each.
Depositional Systems Project: 10%.
Stratigraphy Project: 15%.
Lab Assignments & Lab Exam: 30%.
Mid-Term Exam: 10%. Covers Topics 1-8 in Class Content & Schedule.
Final Exam: 15%. The final is mandatory and will be cumulative.

ATTENDANCE & ACADEMIC INTEGRITY

You are expected to attend all class, lab and field meetings. Excused absences require written documentation and a legitimate academic, medical, or extracurricular justification. Advance written (e-mail is fine) communication of an expected excused absence is required. See University policies related to attendance at the URL:
http://bulletin.sc.edu/content.php?catoid=10&navoid=1781&chl

You are encouraged to collaborate with your fellow students. However, verbatim duplication or other forms of plagiarism or cheating are unacceptable. See the university policy on academic responsibility at the URL: http://www.housing.sc.edu/academicintegrity/