GY 402: Sedimentary Petrology

Lecture 1: Overview of course content; Origin of Sediment

Instructor: Dr. Douglas W. Haywick
Dr. Doug Haywick

Contact Information

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GY 402 course objectives:

To teach geology majors.....
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To teach geology majors.....

- major theoretical components of sedimentology and sedimentary petrology
GY 402 course objectives:

To teach geology majors.....

- ....major theoretical components of sedimentology and sedimentary petrology
- ...practical sedimentary techniques (physical training)
GY 402 course objectives:

To teach geology majors.....

- ....major theoretical components of sedimentology and sedimentary petrology
- ...practical sedimentary techniques *(physical training)*
- ...how to plan and propose research & how to correctly interpret data *(Critical thinking)*
GY 402 course objectives:

To teach geology majors.....

- ....major theoretical components of sedimentology and sedimentary petrology
- ...practical sedimentary techniques (physical training)
- ...how to plan and propose research & how to correctly interpret data (Critical thinking)
- ...how to synthesize research and present results (writing and oral presentation skills)
Why sedimentology is important
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Fact 1: You live right next door to some of the most impressive and important modern sedimentary environments on the planet.
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❖ Fact 2: You live on top of Quaternary and Tertiary sedimentary “basement” rocks.
Why sedimentology is important

- Fact 1: You live right next door to some of the most impressive and important modern sedimentary environments on the planet.
- Fact 2: You live on top of Quaternary and Tertiary sedimentary “basement” rocks.
- Fact 3: Most jobs in geology are “soft rock”-related.
Sedimentary petrology is used in...

- Petroleum exploration/exploitation
Sedimentary petrology is used in...

- Petroleum exploration/exploitation
- Environmental geology/hydrology
Sedimentary petrology is used in...

- Petroleum exploration/exploitation
- Environmental geology/hydrology
- Remote sensing (soils analysis)
Sedimentary petrology is used in…

- Petroleum exploration/exploitation
- Environmental geology/hydrology
- Remote sensing *(soils analysis)*
- Marine geology
Sedimentary petrology is used in…

- Petroleum exploration/exploitation
- Environmental geology/hydrology
- Remote sensing *(soils analysis)*
- Marine geology
- Paleoclimatology
Sedimentary petrology is used in…

- Petroleum exploration/exploitation
- Environmental geology/hydrology
- Remote sensing *(soils analysis)*
- Marine geology
- Paleoclimatolology
- Biology *(substrate in seagrass beds; coral ecology)*
Sedimentary petrology is used in...

- Petroleum exploration/exploitation
- Environmental geology/hydrology
- Remote sensing (soils analysis)
- Marine geology
- Paleoclimatology
- Biology (substrate in seagrass beds; coral ecology)
- Archaeology (lithics analysis)
Sedimentary petrology is used in...

- Petroleum exploration/exploitation
- Mining
- Environmental geology/hydrology
- Remote sensing (soils analysis)
- Marine geology
- Paleoclimatology
- Art (materials in ceramics, pigments etc)
- Biology (substrate in seagrass beds; coral ecology)
- Archaeology (lithics analysis)
- Engineering (materials testing, seawall protection)
GY 402 Contact time
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- Assigned lecture times:
  One 1:15 hour lecture slot per week (T, 11:00 am – 12:15pm)
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  - One 1:15 hour activity slot per week (R, 11:00 am – 12:15pm)
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  - One 1:15 hour lecture slot per week (T, 11:00 am – 12:15pm)
  - One 1:15 hour activity slot per week (R, 11:00 am – 12:15pm)

- **Assigned lab times:**
  - Two 2 hour lab slots per week (T, R 12:00 pm – 1:50pm)

**Note:** Labs are designed to be completed in 2 to 3 hours of focused work
GY 402 Assessment
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Tests: 1) Midterm exam (take home; 10%)
2) Final exam (in class; 10%)
3) Final lab exam (in class; 10%)
GY 402 Assessment

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  2) Final exam (in class; 10%)
  3) Final lab exam (in class; 10%)
- Big Assignments: 1) grain size (10%)
  2) Perdido outcrop (5%)
  3) Moscow Landing (15%)
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  2) Final exam (in class; 10%)
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- Big Assignments: 1) grain size (10%)
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  3) Moscow Landing (15%)
- Lab Assignments: (weekly; Total 15%)
GY 402 Assessment

- **Tests:**
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  2) Final exam (in class; 10%)
  3) Final lab exam (in class; 10%)

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  1) grain size (10%)
     2) Perdido outcrop (5%)
     3) Moscow Landing (15%)

- **Lab Assignments:** (weekly; Total 15%)
- **GSSA Writing Assignments** (10%)
  (8% + 2% cover letters)
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- Lab Assignments: (weekly; Total 15%)
- GSSA Writing Assignments (10%)
- Peer review (5%)
GY 402 Assessment

- Tests: 1) Midterm exam (take home; 10%)
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- Big Assignments: 1) grain size (10%)
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- Lab Assignments: (weekly; Total 15%)
- GSSA Writing Assignments (10%)
- Peer review (5%)
- Participation: (5% each)
 Unless otherwise stated, **All** assignments must be turned in by **11:00 AM** on the due date as specified on the class calendar (due days vary....check the calendar)

- I do not accept late assignments without a valid excuse (e.g., medical)

Know when things are due!

Now about those research papers and writing assignments and how I mark them....
Do not be offended when your stuff come back looking like this:

- constructive criticism is a good thing
Incidentally: Failure, not success, is the norm in research

- too much hand holding is not necessarily a good thing
- rethinking research questions is desirable
Past GY 402 Grade distribution

- Past grade distribution (20 years of data).
  - A: 38%
  - B: 43%
  - C: 07%
  - D/F: 04%
  - WD: 08%
Survival in GY 402

1) Keep track of assignment due dates (Calendar)

2) Check your JAG E-mail daily

3) Become familiar with online support:
   Website: www.southalabama.edu/geology/haywick/gy402
   Facebook: GY 402 Sed Petrology
   Twitter: Sedhead402

4) Work well with others (share duties)

5) Do not stay quiet in class
   (New: student led pre-lecture summaries)
Team work in GY 402

GY 402 is now a flipped class (some online lecture content)

1) Chose teams of 2 for group work
2) Reading assignments, critical reviews
3) student-led discussions and lecture reviews
Thin section petrography:
Modern sediment (John Brewer Reef, Australia)

Foraminifera

Bryozoan

0.75 mm FOV, XN
Rugose coral in Paleozoic Bangor Limestone (Alabama)

Coral skeletons

Brecciation (post-lithification)

Ferroan calcite cement

2.5 mm FOV, PPL, Stained
Litharenite

(Cretaceous, Alberta)

Chert

Rock Frag.

Limonite

Plag feldspar

Quartz

2.0 mm FOV, XN
Origin of sediment
Origin of sediment

- Siliciclastic (reworked stuff)
Origin of sediment

- Siliciclastic (reworked stuff)
- Volcaniclastic (primary deposition)
Origin of sediment

- Siliciclastic (reworked stuff)
- Volcaniclastic (primary deposition)
- Carbonate (*in situ* mostly biogenic)
Origin of sediment

- Siliciclastic (reworked stuff)
- Volcaniclastic (primary deposition)
- Carbonate (*in situ* mostly biogenic)
- Chemical (evaporite/hydrothermal)
NASA Landsat image
Alluvial fans

Rocks:
- Breccia
- Arkose
- Sandstone
- Red Shale

Fossils: None

Climate: Arid
Rivers (Braided & Meandering)

Rocks:
- Conglomerate
- Lithic sandstone
- Red Shale

Fossils: Plants/bones

Climate: Wet to dry
Beaches (open - shoreline attached)

Rocks:
- Quartz Arenite
- Shale/siltstone

Fossils: Lots! (shells)

Climate: Arid to wet
Swamps (open - shoreline attached)

Rocks:
- Coals
- Black Shale

Fossils: Lots!
(plants)

Climate: Wet
Reefs (stromatolitic)

Rocks:
- Limestone (bindstone)
- Limestone (grain stone)

Fossils: Lots! (corals etc.)

Climate: Tropical
Upcoming Stuff

10 minute break

Followed by
Lecture 2: Grain size and sediment descriptions
GY 402: Sedimentary Petrology

Lecture 1: Class Introduction

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