GY 402: Sedimentary Petrology

Lecture 2:
Grain size and Descriptive Parameters

Instructor: Dr. Douglas W. Haywick
Lecture 2 Agenda

A) Basic sediment grain size
B) Ternary plots
C) Interpreting grain size data
D) Grain size parameters
Grain size

There are several different schemes:
1) US Army Corp of Engineers (mesh size)
2) Soil scientists
3) Academic geologists (metric)
Udden-Wentworth grain size
(Wentworth, 1922)

Gravel: (>2.00 mm)
Sand: (0.063 mm – 2.00 mm)
Silt: (0.004 mm – 0.063 mm)
Clay: (< 0.004 mm)
Phi (Φ) grain size

\[ \Phi = -\log_2 d \]
**Phi (Φ) grain size**

\[ \Phi = -\log_2 d \]

<table>
<thead>
<tr>
<th>Actual Size (mm)</th>
<th>Wentworth Size Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 mm</td>
<td>0</td>
</tr>
<tr>
<td>4 mm</td>
<td>-1Φ</td>
</tr>
<tr>
<td>2 mm</td>
<td>-2Φ</td>
</tr>
<tr>
<td>1 mm</td>
<td>-3Φ</td>
</tr>
<tr>
<td>500 µm</td>
<td>+1Φ</td>
</tr>
<tr>
<td>250 µm</td>
<td>+2Φ</td>
</tr>
<tr>
<td>125 µm</td>
<td>+3Φ</td>
</tr>
<tr>
<td>62.5 µm</td>
<td>+4Φ</td>
</tr>
<tr>
<td>4 µm</td>
<td>+8Φ</td>
</tr>
</tbody>
</table>

# Grain size classification (simplified)

<table>
<thead>
<tr>
<th>Grain Size (mm)</th>
<th>Sediment Name</th>
<th>Rock Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse</td>
<td></td>
<td>CONGLOMERATE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(rounded clasts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or BRECCIA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(angular clasts)</td>
</tr>
<tr>
<td>Fine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; 64</td>
<td>boulders</td>
<td></td>
</tr>
<tr>
<td>-16</td>
<td>cobbles</td>
<td></td>
</tr>
<tr>
<td>-2.00</td>
<td>pebbles</td>
<td></td>
</tr>
<tr>
<td>-1.00</td>
<td>v. coarse sand</td>
<td>SANDSTONE</td>
</tr>
<tr>
<td>-0.50</td>
<td>coarse sand</td>
<td></td>
</tr>
<tr>
<td>-0.25</td>
<td>medium sand</td>
<td></td>
</tr>
<tr>
<td>-0.125</td>
<td>fine sand</td>
<td></td>
</tr>
<tr>
<td>-0.063</td>
<td>very fine sand</td>
<td></td>
</tr>
<tr>
<td>-0.004</td>
<td>silt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>clay</td>
<td>CLAYSTONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MUD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SILTSTONE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CLAYSTONE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MUDSTONE</td>
<td></td>
</tr>
</tbody>
</table>
Grain size classification

With grain size data, you have 4 variables that you need to be able to visualize. Graphically, this is not easy as we only have 2 dimensions to work with.

The solution.....
Grain size classification

With grain size data, you have 4 variables that you need to be able to visualize. Graphically, this is not easy as we only have 2 dimensions to work with.

The solution….. Ternary plots.
Sand-Silt-Clay
Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ- sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand
Sand-Silt-Clay
Scheme 2
Sheppard (1954)

Symbol Index

C-clay; Z-silt; S-sand;

sC-sandy clay;
zS-silty sand;
sZ- sandy silt;
zC- silty clay

cS-clayey sand;
szc-sand-silt-clay;
cZ-clayey silt
Gravel-Silt-Fines Scheme
Folk (1954)

Symbol Index

M-mud; G-gravel; S-sand;
sM—sandy mud;
mS—muddy sand;
(g)M—slightly gravelly mud;
(g)S—slightly gravelly sand;
(g)sM—slightly gravelly sandy mud;
(g)mS—slightly gravelly muddy sand;
gM—gravelly mud; gms—gravelly muddy sand; gS—gravelly sand;
mG—muddy gravel; MsG—muddy sandy gravel; sG—sandy gravel
Plotting data
Folk (1954)
Sand-Silt-Clay
Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ- sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand

100% Sand
100% clay
100% Silt
Sand-Silt-Clay
Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ-sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand

50% clay, 50% sand,
Sand-Silt-Clay Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ-sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand
Sand-Silt-Clay Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ- sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand
Sand-Silt-Clay Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ- sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand
Sand-Silt-Clay
Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ- sandy silt;
cS- clayey sand;
mS-muddy sand;
zS-silty sand
Sand-Silt-Clay Scheme 1
Folk (1954)

Symbol Index
C-clay; Z-silt; M-mud;
S-sand;
sC-sandy clay;
sM-sandy mud;
sZ- sandy silt;
cS-clayey sand;
mS-muddy sand;
zS-silty sand
Plotting data
Folk (1954)

Example data point:
Sand: 46%; Clay 25%; Silt: 29%
Plotting data
Folk (1954)

Example data point:
Sand: 46%; Clay 25%; Silt: 29%

Step 1: Plot sand (46%)
Plotting data

Folk (1954)

Example data point:
Sand: 46%; Clay 25%; Silt: 29%

Step 1: Plot sand (46%)
Step 2: Plot clay (25%)
Plotting data
Folk (1954)

Example data point:
Sand: 46%; Clay 25%; Silt: 29%

Step 1: Plot sand (46%)
Step 2: Plot clay (25%)
Step 3: Confirm silt (29%)
Plotting data
Folk (1954)

Example data point:
Sand: 46%; Clay 25%; Silt: 29%

Step 1: Plot sand (46%)
Step 2: Plot clay (25%)
Step 3: Confirm silt (29%)

Your sample is sandy mud (sM)
Grain Size Histograms: Case Study 1
Fine grained sediment. Depositional energy _______?
Grain Size Histograms: Case Study 2

The diagram shows the distribution of grain sizes with weight percentage retained per sieve. The x-axis represents grain size categories including gravel, vc sand, c sand, m sand, f sand, vf sand, coarse silt, fine silt, and clay. The y-axis measures the weight percentage retained per sieve, ranging from 0.00 to 45.00. The histogram indicates varying amounts of each grain size category, with f sand having the highest percentage, followed by vf sand and coarse silt.
Grain Size Histograms: Case Study 2

Moderately sorted sediment. Depositional energy _______?
Grain Size Histograms: Case Study 3
Bimodal sediment. Depositional energy ___________ ?
Bimodal sediment. Depositional energy _________?
Depositional environment: ____________________?
# Descriptive parameters

<table>
<thead>
<tr>
<th>Measure</th>
<th>Trask†</th>
<th>Inman</th>
<th>Folk and Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>$Md = P_{30}$†</td>
<td>$Md_\phi = \phi_{50}$§</td>
<td>$Md_\phi = \phi_{50}$</td>
</tr>
<tr>
<td>Mean</td>
<td>$M = \frac{P_{25} + P_{75}}{2}$</td>
<td>$M_\phi = \frac{\phi_{16} + \phi_{84}}{2}$</td>
<td>$M_z = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3}$</td>
</tr>
<tr>
<td>Dispersion (sorting)</td>
<td>$So = \frac{P_{75}}{P_{25}}$</td>
<td>$\sigma_\phi = \frac{\phi_{84} - \phi_{16}}{2}$</td>
<td>$\sigma_I = \frac{\phi_{84} - \phi_{16} + \phi_{93} - \phi_{5}}{6.6}$</td>
</tr>
<tr>
<td>Skewness</td>
<td>$Sk = \frac{P_{75}P_{25}}{Md^2}$</td>
<td>$\alpha_\phi = \frac{M_\phi - Md_\phi}{\sigma_\phi}$</td>
<td>$Sk_I = \frac{\phi_{16} + \phi_{84} - \phi_{50}}{2(\phi_{84} - \phi_{16})}$ + \frac{\phi_{5} + \phi_{95} - 2\phi_{50}}{2(\phi_{95} - \phi_{5})}$</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>$K = \frac{P_{75} - P_{25}}{2(P_{90} - P_{10})}$</td>
<td>$\beta_\phi = \frac{\frac{1}{2}(\phi_{95} - \phi_{5}) - \sigma_\phi}{\sigma_\phi}$</td>
<td>$K_G = \frac{\phi_{95} - \phi_{5}}{2.44(\phi_{75} - \phi_{25})}$</td>
</tr>
</tbody>
</table>

†The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of $Sk$ rather than $Sk$ itself as a measure of skewness.
‡$P$ indicates a percentile measure, measured in millimeters.
§$\phi$ indicates a $\phi$ percentile.

Source: Blatt, Middleton and Murray (1980)
Descriptive parameters

Source: Blatt, Middleton and Murray (1980)
**Descriptive parameters**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Trask†</th>
<th>Inman</th>
<th>Folk and Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>$M_d = P_{50}$†</td>
<td>$M_d = \phi_{50}$§</td>
<td>$M_d = \phi_{50}$</td>
</tr>
<tr>
<td>Mean</td>
<td>$M = \frac{P_{25} + P_{75}}{2}$</td>
<td>$M_d = \frac{\phi_{16} + \phi_{84}}{2}$</td>
<td>$M_s = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3}$</td>
</tr>
<tr>
<td>Dispersion</td>
<td>$D_o = \frac{P_{75}}{P_{25}}$</td>
<td>$\sigma_d = \frac{\phi_{84} - \phi_{16}}{2}$</td>
<td>$\sigma_s = \frac{\phi_{84} - \phi_{16} + \phi_{25} - \phi_{50}}{4}$</td>
</tr>
<tr>
<td>(sorting)</td>
<td></td>
<td></td>
<td>$\text{Sk}<em>1 = \frac{\phi</em>{16} + \phi_{84} - \phi_{50}}{2(\phi_{16} - \phi_{50})}$ + $\phi_5 + \phi_{95} - 2\phi_{50}$ + $\frac{\phi_{95} - \phi_{50}}{2(\phi_{95} - \phi_{5})}$</td>
</tr>
<tr>
<td>Skewness</td>
<td>$S_k = \frac{P_{25}P_{75}}{M_d^2}$</td>
<td>$a_d = \frac{M_d - M_d}{\sigma_d}$</td>
<td>$\beta_d = \frac{4(\phi_5 + \phi_{95}) - M_d}{\sigma_d}$</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>$K = \frac{P_{75} - P_{25}}{2(P_{90} - P_{10})}$</td>
<td>$\beta_d = \frac{4(\phi_3 - \phi_5) - \sigma_d}{\sigma_d}$</td>
<td>$K_0 = \frac{\phi_{95} - \phi_5}{2.44(\phi_{75} - \phi_{25})}$</td>
</tr>
</tbody>
</table>

†The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of $Sk$ rather than $Sk$ itself as a measure of skewness.
††$P$ indicates a percentile measure, measured in millimeters.
§§$\phi$ indicates a $\phi$ percentile.

Source: Blatt, Middleton and Murray (1980)
Descriptive parameters

Median = $\Phi_{50}$

<table>
<thead>
<tr>
<th>Measure</th>
<th>Trask†</th>
<th>Inman</th>
<th>Folk and Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>$Md = P_{50}^{†}$</td>
<td>$Md = \phi_{50}^{§}$</td>
<td>$Md = \phi_{50}$</td>
</tr>
<tr>
<td>Mean</td>
<td>$M = \frac{P_{25} + P_{75}}{2}$</td>
<td>$M = \frac{\phi_{16} + \phi_{84}}{2}$</td>
<td>$M = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3}$</td>
</tr>
<tr>
<td>Dispersion (sorting)</td>
<td>$S_0 = \frac{P_{75}}{P_{25}}$</td>
<td>$\sigma_\phi = \frac{\phi_{94} - \phi_{16}}{2}$</td>
<td>$\sigma_\phi = \frac{\phi_{84} - \phi_{16} + \phi_{25} - \phi_{5}}{4}$</td>
</tr>
<tr>
<td>Skewness</td>
<td>$Sk = \frac{P_{25}P_{75}}{M d^2}$</td>
<td>$\alpha_\phi = \frac{M d - Md_\phi}{\sigma_\phi}$</td>
<td>$Sk = \frac{\phi_{16} + \phi_{84} - \phi_{50}}{2(\phi_{16} - \phi_{16}) + \phi_{5} + \phi_{95} - 2\phi_{50}}$</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>$K = \frac{P_{75} - P_{25}}{2(P_{90} - P_{10})}$</td>
<td>$\beta_\phi = \frac{1}{4}(\phi_{95} - \phi_{5}) - \frac{\sigma_\phi}{\sigma_\phi}$</td>
<td>$K_0 = \frac{\phi_{95} - \phi_{5}}{2.44(\phi_{75} - \phi_{25})}$</td>
</tr>
</tbody>
</table>

†The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of $Sk$ rather than $Sk$ itself as a measure of skewness.
‡$P$ indicates a percentile measure, measured in millimeters.
§$\phi$ indicates a $\phi$ percentile.

Source: Blatt, Middleton and Murray (1980)
Descriptive parameters

Mean (average) = \( \frac{\Phi_{16} + \Phi_{50} + \Phi_{84}}{3} \)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Trask†</th>
<th>Inman</th>
<th>Folk and Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>( M_d = P_{50} )</td>
<td>( M_d = \phi_{50} )</td>
<td>( M_d = \phi_{50} )</td>
</tr>
<tr>
<td>Mean</td>
<td>( M = \frac{P_{25} + P_{75}}{2} )</td>
<td>( M_6 = \frac{\phi_{16} + \phi_{84}}{2} )</td>
<td>( M_6 = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3} )</td>
</tr>
<tr>
<td>Dispersion (sorting)</td>
<td>( S_0 = \frac{P_{75}}{P_{25}} )</td>
<td>( \sigma_6 = \frac{\phi_{84} - \phi_{16}}{2} )</td>
<td>( \sigma_4 = \frac{\phi_{84} - \phi_{16} + \phi_{25} - \phi_{5}}{6.6} )</td>
</tr>
<tr>
<td>Skewness</td>
<td>( S_k = \frac{P_{25}P_{75}}{M_d^2} )</td>
<td>( \alpha_4 = \frac{M_6 - M_d}{\sigma_6} )</td>
<td>( S_k = \frac{\phi_{16} + \phi_{84} - \phi_{50}}{2(\phi_{84} - \phi_{16})} ) + ( \frac{\phi_5 + \phi_{25} - 2\phi_{52}}{2(\phi_{95} - \phi_5)} )</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>( K = \frac{P_{75} - P_{25}}{2(P_{90} - P_{10})} )</td>
<td>( \beta_4 = \frac{1}{6}(\phi_{93} - \phi_{15}) - \frac{\sigma_6}{\sigma_6} )</td>
<td>( K_0 = \frac{\phi_{93} - \phi_5}{2.44(\phi_{75} - \phi_{25})} )</td>
</tr>
</tbody>
</table>

†The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of \( S_k \) rather than \( S_k \) itself as a measure of skewness. ††P indicates a percentile measure, measured in millimeters. §\( \phi \) indicates a \( \phi \) percentile.

Source: Blatt, Middleton and Murray (1980)
Descriptive parameters

\[
\text{Sorting} = \frac{\Phi_{84} - \Phi_{16}}{4} + \frac{\Phi_{95} - \Phi_{5}}{6.6}
\]

Source: Blatt, Middleton and Murray (1980)
Descriptive parameters

Mode = the most frequent particle size

<table>
<thead>
<tr>
<th>Measure</th>
<th>Trask†</th>
<th>Inman</th>
<th>Folk and Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>$Md = P_{30}$†</td>
<td>$Md_4 = \phi_{50}$§</td>
<td>$Md_6 = \phi_{50}$</td>
</tr>
<tr>
<td>Mean</td>
<td>$M = \frac{P_{25} + P_{75}}{2}$</td>
<td>$M_6 = \frac{\phi_{16} + \phi_{84}}{2}$</td>
<td>$M_6 = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3}$</td>
</tr>
<tr>
<td>Dispersion</td>
<td>$S_0 = \frac{P_{75}}{P_{25}}$</td>
<td>$\sigma_6 = \frac{\phi_{84} - \phi_{16}}{2}$</td>
<td>$\sigma_1 = \frac{\phi_{84} - \phi_{16} + \phi_{95} - \phi_5}{6.6}$</td>
</tr>
<tr>
<td>Skewness</td>
<td>$Sk = \frac{P_{75}P_{25}}{Md^2}$</td>
<td>$\alpha_6 = \frac{M_6 - Md_6}{\sigma_6}$</td>
<td>$Sk_1 = \frac{\phi_{16} + \phi_{84} - \phi_{50}}{2(\phi_{84} - \phi_{16})}$ + $\frac{\phi_5 + \phi_{95} - 2\phi_{50}}{2(\phi_{95} - \phi_5)}$</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>$K = \frac{P_{75} - P_{25}}{2(P_{80} - P_{10})}$</td>
<td>$\beta_6 = \frac{\phi_{95} - \phi_5 - \phi_5}{\sigma_6}$</td>
<td>$K_0 = \frac{\phi_{95} - \phi_5}{2.44(\phi_{75} - \phi_{25})}$</td>
</tr>
</tbody>
</table>

†The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of $Sk$ rather than $Sk$ itself as a measure of skewness.
‡$P$ indicates a percentile measure, measured in millimeters.
§$\phi$ indicates a $\phi$ percentile.

Source: Blatt, Middleton and Murray (1980)
Descriptive parameters

Descriptive measures of sediment-size distribution according to several authors:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Track</th>
<th>Jamon</th>
<th>Folk and Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>$Md = P_{50}$</td>
<td>$Md_3 = \Phi_{16}$</td>
<td>$Md_4 = \Phi_5$</td>
</tr>
<tr>
<td>Mean</td>
<td>$M = \frac{P_{16} + P_{84}}{2}$</td>
<td>$M_4 = \frac{\Phi_{16} + \Phi_{84}}{2}$</td>
<td>$M_5 = \frac{\Phi_{16} + \Phi_{50} + \Phi_{84}}{3}$</td>
</tr>
<tr>
<td>Dispersion (sorting)</td>
<td>$S_0 = \frac{P_{84}}{P_{16}}$</td>
<td>$\sigma_3 = \frac{\Phi_{84} - \Phi_{16}}{2}$</td>
<td>$\sigma_5 = \frac{\Phi_{84} - \Phi_{16} + \Phi_{84} - \Phi_{50}}{4}$</td>
</tr>
<tr>
<td>Skewness</td>
<td>$Sk = \frac{P_{95} - P_{50}}{M_1}$</td>
<td>$\sigma_4 = \frac{Md_3 - Md_4}{P_{16}}$</td>
<td>$\sigma_5 = \frac{Md_3 - Md_4 + (\Phi_{84} - \Phi_{16})}{2(P_{16} - \Phi_{16})}$</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>$K = \frac{P_{95} - P_{50}}{2(P_{95} - P_{16})}$</td>
<td>$\beta_2 = \frac{\Phi_{84} - \Phi_{16}}{\sigma_4}$</td>
<td>$\beta_2 = \frac{\Phi_{95} - \Phi_5}{2(\Phi_{95} - \Phi_5)}$</td>
</tr>
</tbody>
</table>

*The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of $Sk$ rather than $Sk$ itself as a measure of skewness.

$\Phi$ indicates a percentile measure, measured in millimeters.

$\Phi_4$ indicates $\Phi$ percentile.

**Skewness:**

\[
\Phi_{16} + \Phi_{84} + 2 \Phi_{50} + \frac{\Phi_{16} + \Phi_{84} + 2 \Phi_{50}}{2(\Phi_{84} - \Phi_{16})} - \frac{\Phi_{16} + \Phi_{84} + 2 \Phi_{50}}{2(\Phi_{95} - \Phi_{5})}
\]

Positive (fine) skewness Symmetrical Negative (coarse) skewness
Descriptive parameters

- Kurtosis (curve peakedness) =

\[
\frac{\Phi_{95} - \Phi_5}{2.44(\Phi_{75} - \Phi_{25})}
\]

Platykurtic  Mesokurtic  Leptokurtic
Other descriptive parameters

- Roundness
- Particle shape
Other descriptive parameters

- **Roundness**
  - very angular
  - very round

- **Particle shape**
  - square
  - rectangular
Other descriptive parameters

- Roundness
- Particle shape

Both of these can be quantitatively measured but what a pain in the ass! Much better to use qualitative methods.
Roundness

(comparison of determination techniques)
Figure 14: Grain Sphericity: Composite Sample 4

Roundness Scale (Powers, 1953)
Descriptive parameters (simple visual comparisons)

A) Grain Size
- Coarse
- Fine
- Very Fine

B) Rounding
- Angular
- Subangular
- Well Rounded

C) Sorting
- Poor
- Moderate
- Well Sorted
Sampling Techniques

• Unconsolidated (soft) sediment (grab, coring, hand sampling)

• Lithified sedimentary rock (hammer, drill, saw)
Upcoming Stuff

**Homework**
Writing Assignment 1 (Paper structure): Due Thursday
2) Read Grain Size Lab Manual (online)
3) Formalize your 2 person sed team

**Thursday: No Lecture**
Botanical Gardens walkabout (grain size assignment prep)
meet as usual at 11 AM in LSCB 316

**This Weekend**
Think about your project; get your samples

**Next Tuesday:**
Sedimentary Rock Classification
Check the Calendar!

**GY 402 Schedule of Events** (current January 9, 2017)

<table>
<thead>
<tr>
<th>Sun</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Week 1</td>
<td>Classes Begin</td>
<td>Double Lecture (1,2) (No Lab)</td>
<td></td>
<td>Botanical Gardens Trip Activity 1 Write 1 Due</td>
<td>Activity 1 due</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Week 2 Dauphin Island Field Trip</td>
<td>MLK day</td>
<td>Lecture (3)</td>
<td>Online Lecture (4)</td>
<td>Activity 2 Write 2 Due Write 1 redo due</td>
<td>Peer 1 Due</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Week 3</td>
<td>Lecture (5)</td>
<td>Online Lecture (6)</td>
<td>Lecture (7) Write 2 redo due Activity 2 due</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>Lecture (8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GY 402 Sedimentary Petrology (W)
GSSA Writing Assignment One
Dissecting Components of a Scientific Paper

Your Task: This first writing assignment will be very simple, if you have every had any scientific writing experience in the past. Most of you should have already taken GY 304-Stratigraphy (which is now a prerequisite for GY 402), so you should be familiar with the make up of a scientific paper (AKA term paper). So what exactly is your task today? I would like you to compare and contrast the abstract, introduction and conclusions sections of a typical scientific paper. This does not mean that you actually give me examples of these components. That will come soon enough. In this assignment, I want you to tell me what the structure, purpose and format is (or should be) for an abstract, an introduction and the conclusions of a paper. All three are somewhat similar, but they are more different than they are alike, hence the question.

Your answer should not exceed one page (typed, double spaced, 12 pitch Times Roman font). Typical quality answers will be between $\frac{1}{2}$ and 1 page in length. The assignment is redoable; that means that you can resubmit it for revised credit after a “first draft”. The maximum mark up that you can receive in a revised grade is $+10\%$ of your initial grade. If your first draft received a grade of 65%, the best you can do in the revision is $75\%$ even if your revision is absolutely fraking* perfect. Do the best job you can the first time around.

Remember that you are now working for the GSSA. Please attach a cover letter to this assignment. Your cover letter should explain what the attachment is, should be properly formatted, dated, addressed to your boss and signed. Your name and position should also be typed below the signature line. (see my example on the next page).

Due date/Revision date: refer to the due dates page on the website/calendar.
GY 402: Sedimentary Petrology

Lecture 2: Grain Size

Instructor: Dr. Doug Haywick
dhaywick@southalabama.edu

This is a free open access lecture, but not for commercial purposes.
For personal use only.