LAB 1:
CLASSIFICATION OF SEDIMENTARY ROCKS & STRUCTURES

Naming Clastic Sedimentary Rocks

The names of clastic sedimentary rocks are based on the descriptions you have already learned. Table 1.3 shows how clastic rocks are named.

You must provide a full description followed by the descriptive rock type name:

Colour, (Sorting), (Rounding), (Sphericity), Grain Size, Gain Category, (Other Features): Descriptive Rock Name

For example:

Red, well-sorted, well-rounded, high sphericity, grain size is gravel and larger, grains are rock fragments: Conglomerate

Table 1.3: Names of sedimentary rocks

Sorting	Rounding	Sphericity	Grain size	Grain Category	Other Features	Clastic Rock Type
	Rounded		>2mm	Gravels	Mostly composed of rock fragments	**Conglomerate**
	Angular		>2mm		Mostly composed of rock fragments	**Breccia**
			1/16 – 2 mm	Sandstones	Quartz grains	**Quartz Sandstone**
					>25% of grains are feldspar	**Arkose**
					Mostly rock fragments	**Lithic sandstone**
					Contains abundant silt and clay	**Greywacke**
	(Not visible)	(Not visible)	1/256 – 1/16 mm	Silts	Non-fissile	**Siltstone**
	(Not visible)	(Not visible)			Fissile	**Shale**
	(Not visible)	(Not visible)	< 1/256 mm	Clays	Non-fissile	**Claystone**
	(Not visible)	(Not visible)			Fissile	**Shale**

NOTE: Average grain size is estimated in mm, then used to assigned a grain size category.

EXERCISE 1.1: Describing Clastic Sedimentary Rocks

Describe the clastic rock specimens provided by your instructor using Table 1.3. Use a magnifying lens and a grain card to help you identify the average grain size, sorting, roundedness and sphericity.

Table 1.4: Descriptions and names of rock specimens

Sample #	Colour	Sorting	Rounding	Sphericity	Grain Size (mm)	Grain Size (Name)	Other Features	Rock Name

NOTES: Average grain size is estimated in mm, then used ot assign a grain size category.
You should attempt to put something in each space in the table. In rare cases (such as with the "Other Features" column) there may be nothing of note. When this happens, write "None" in the space.

EXERCISE 1.2: Describing Chemical and Biochemical Sedimentary Rocks

Fill in the table below to create a full rock description for the specimens provided by the instructor. These are both carbonates and non-carbonates.

Table 1.6: Descriptions and names of chemical and biochemical rock specimens

Sample ID	Colour	Dominant Mineral	Grain Type*	Matrix*	Other Features	Name

*Features not described for non-carbonate sedimentary rocks

EXERCISE 1.3: Sedimentary Structures

Bedding
Sediments and sedimentary rocks can be separated into different beds of varying thickness. A bed is a layer of sediment that is distinct from sediments above and below because of differences in grain size, mineralogy, cementing agents, fossils, sedimentary structures, and other properties. There are several types of beds:

Parallel bedding – beds are parallel to one another. Samples: __________________

Laminated (or laminar) bedding – a type of parallel bedding, where the beds are very thin (mm scale). Samples: __________________

Cross-bedding – beds over 1 cm thick, inclined at an angle to the original surface of deposition. (Cross-laminations are similar structures with thicknesses <1cm.) Under flowing water or air (wind) the sediment surface will form ripples ranging from cm's high up to dunes that are m's high (Figures 1.5, 1.6). The flowing water or air speeds up when it climbs the upstream side and may pick up or erode some of the sediment there. When it passes over the crest the water or air slows down and sediment will settle out of suspension on the downstream side of the ripple, adding layers to that side. Over time, the whole ripple or dune moves downstream as sediment is added to the downstream face. For sediments deposited in water, larger cross-beds indicate faster moving water or larger water waves. Samples: __________________

Asymmetrical cross-beds – Cross-beds or cross-laminations forming in a stream are uni-directional because water flows only in one direction. Material is removed from the upstream side and deposited on the downstream side (Figure 1.7a), and the resulting ripple has a steeper slope on the downstream side. Samples: __________________

Symmetrical cross-beds – Sediments on or near beaches in lakes and at the ocean encounter wave action which reworks the sediment back and forth as the waves come on shore and off. Cross-beds or cross-laminations form as sediment is added into this wave action. Some will be preserved going onshore, and some offshore (Figure 1.7b). The result is symmetrical cross-beds that form a herringbone pattern. These features indicate near-shore conditions in a lake or ocean.
Samples: __________________

Graded bedding: Grain size may change through a bed and the trend is described from the bottom to the top (oldest to youngest). Normally grain size decreases upwards, indicating that a higher energy environment gradually slowed down and allowed finer sediments to settle out on top of coarser sediments. This might be typical of sediments deposited from a river where flow decreased over time, or at the beach following a big rainfall or storm event. This is referred to as a fining upward sequence (FUS). Coarsening upward sequences (CUS) are less commonly preserved in a bed. If energy was rising in a river or beach, then chances are, the higher energy later in time will erode and re-deposit any finer sediment.
Samples: __________________

Mud Cracks are formed by the drying and shrinking of mud exposed to air. Drying creates either polygonal shaped desiccation cracks or mud curls. They are common in desert (playa) lakes, tidal flats and the flood plains of rivers, where fine sediments are deposited at the edges of water bodies that then dry out or where water levels drop. Samples: __________________