

**GEOL 262/362 Geochemistry  
Syllabus 2020**

| Date                        |   | 9am Lecture  | 1pm Lecture  | 3pm Tutorial            | Lab Stream |   |   |
|-----------------------------|---|--|--|-------------------------|------------|---|---|
| <b>Water-Rock Reactions</b> | Week 1<br>July 6                          | Course introduction, mass & charge balance, reaction & equilibrium CEM   | equilibrium constant (Keq), concentration v activity, solubility product (Ksp) CEM | Organize lab groups CEM | 1          | 2 | 3 |
|                             | Week 2<br>July 13                         | Chemical weathering, rivers & groundwaters CEM                           | Carbonate equilibria CEM   | Lo-T tutorial CEM       |            |   |   |
|                             | Week 3<br>July 20                         | Hydrothermal solubility of ore & vein minerals, ligands, Keq at hi-T JMP | Hydrothermal wall-rock alteration, water-rock ratios JMP                           | Hi-T tutorial JMP       |            |   |   |
| <b>Trace Elements</b>       | Week 4<br>July 27                         | Nucleosynthesis, periodic properties, distribution coefficients CEM      | Crystal-chemical controls on trace element distribution CEM                        | <b>PS1 due</b>          |            |   |   |
|                             | Week 5<br>August 3                        | Trace elements: magmatic processes JMP                                   | Trace elements: how to make a gold deposit JMP                                     | Hi-T tutorial JMP       |            |   |   |
|                             | Week 6<br>August 10                       | Trace elements in natural waters, Eh-pH CEM                              | Trace elements: toxicity CEM   | Lo-T tutorial CEM       |            |   |   |
| <b>Radiogenic Isotopes</b>  | Week 7<br>August 17                       | Radioactivity, decay & age equations CEM                                 | Rb-Sr isotope system CEM   | <b>PS2 due</b>          |            |   |   |
|                             | <b>MID-SEMESTER BREAK, August 24 – 28</b> |  |  |                         |            |   |   |
|                             | Week 8<br>August 31                       | Sm-Nd isotope system CEM   | U-Pb isotope system, age of Earth, zircon dating JMP                               | Hi-T tutorial CEM       |            |   |   |
|                             | Week 9<br>September 7                     | Sr isotopes in natural waters CEM  | Nd isotopes in seawater CRR  | Lo-T tutorial CEM       |            |   |   |
| <b>Stable Isotopes</b>      | Week 10<br>September 14                   | Stable isotope mass fractionation CMM                                    | Stable isotopes of C, O, H & S CMM   | <b>PS3 due</b>          |            |   |   |
|                             | Week 11<br>September 21                   | Stable isotopes in lo-T environments CMM                                 | Stable isotopes in lo-T environments continued CMM                                 | Lo-T tutorial CMM       |            |   |   |
|                             | Week 12<br>September 28                   | Oxygen isotopes in hydrothermal systems JMP                              | Stable isotopes in magmatic & metamorphic processes JMP                            | Hi-T tutorial JMP       |            |   |   |
| Week 13<br>October 5        | No class                                  | No class   | <b>PS4 due</b>   |                         |            |   |   |

Coordinator: Candace Martin (1s10); Instructors: Chris Moy (2s4), Mike Palin (1s9), Christina Riesselman (Gn1); Demonstrators: Lucy David and Clarissa Ross

Text (recommended): Robin Gill, Chemical Fundamentals of Geology & Environmental Science, Wiley-Blackwell (2015)

Lectures: Quad 1, 9:00 & 1:00 M; Tutorials: 1s6, 15:00-17:50 M

**Assessment: Problem Sets (PS) 4 x 10% = 40%, Lab Report (LR) 1 x 20%, Final Exam 40%.**

Workload guidelines:

| activity        | number    | x                | hrs each = | total hrs  | marks |
|-----------------|-----------|------------------|------------|------------|-------|
| lecture         | 12        | weeks            | 2          | 24         |       |
| lecture prep    | 12        | weeks            | 5          | 60         |       |
| field & labwork | 1         |                  | 12         | 12         |       |
| lab write-up    | 1         |                  | 15         | 15         | 20%   |
| prob sets       | 4         |                  | 10         | 40         | 40%   |
| final exam      |           |                  | 3          | 30         | 40%   |
| exam prep       | 9         | hr prep/ hr exam |            |            |       |
| <b>total</b>    | <b>18</b> | <b>pts</b>       | <b>10</b>  | <b>181</b> | ok    |

