**Geobiology: Spring 2017**

**Course Objectives**:

This course will evaluate the interplay between biological and geological processes in shaping the surface Earth. Major topics include: the role of microbes in major element cycling (C, N, S, Fe), historical geobiology (how has life changed the planet over time?), methodologies applied in geobiology, and the related fields of astro/exobiology.

Prof. Magdalena Osburn

Maggie@earth.northwestern.edu

Phone: (847) 491-4254

Office: Tech F291

Office Hours: Arranged upon request

**Textbook**: *Fundamentals of Geobiology*, eds Knoll, Canfield, Konhauser. Wiley-Blackwell 2012.

**Prerequisites**: Ge 201 and Chem 103 or permission from Prof. Osburn

**Topic Schedule**: **Reading Schedule**

**Week 1** 3/28 What is Geobiology? none

 3/30 Origins: Life and Metabolism 17

 3/31 **Lab 1**: Unknowns: Getting your eye into rocks

**Week 2** 4/4 Biology in Element cycles: Carbon M&L 1

 4/6 Biology in Element cycles: Nitrogen 4

 4/7 **Problem Set 1**: C & N

**Week 3** 4/11 Biology in Element cycles: Sulfur 5

 4/13 Biology in Element cycles: Iron 6

 4/14 **Problem Set 2**: fire and brimstone

**Week 4** 4/18 Biomineralization by Microbes 8

 4/20 The fossil record of microbes 16

 4/21 **Lab 2**: Microbial Fossils

**Week 5** 4/25 Biomineralization: Eukaryotes (Jamie lectures) 10

 4/27 Plants and Animals (Jamie lectures) 11

 4/28 **Midterm during lab period**

**Week 6** 5/2 Toolbox: Molecular Methods 13

 5/4 Toolbox: Stable Isotope techniques 14

 5/5 **Lab 3**: Welcome to the lab

**Week 7** 5/9 Toolbox: Biomarkers 15

 5/11 Historical Geobiology: Archean 19

 5/12 **Problem Set 3**: Toolbox application

**Week 8** 5/16 Historical Geobiology: Proterozoic 20

 5/18 Historical Geobiology: Phanerozoic 21

 5/19 **Lab 4**: Fossils

**Week 9** 5/23 Humans as agents of Geobiology 22

 5/25 Astro- and Exobiology none

 6/5 **Final**

**Course Requirements**:

This course will feature active learning techniques in addition to lecture components. Active learning time in the classroom will require that reading be done **ahead of time** in preparation for class. Reading quizzes must be completed on Caesar before each class period, they will **not be available afterward**! It also requires that you attend class daily and participate. Problem sets and labs will be due one week after they were distributed. For all assignments, points will be deducted for late work and will **not be accepted** after graded assignments have been returned. An additional 5 page final paper will be required of graduate students.

Reading quizzes 10%

Class participation 10%

Problem Sets/ Labs 30%

Midterm 20%

Final 30%

Graduate students: Final paper 10% (above sum = 90%)

**Collaborations and Academic Ethics**: Science is a generally collaborative enterprise and I expect our classroom interactions to reflect this fact. I encourage you to discuss and collaborate on labs and problem sets, but the work you turn in must be your own. No copying directly from one another! I take academic integrity very seriously and all suspected cases will be immediately turned over to the College for formal review.

**Disability Accommodations**: Any student with a documented disability needing accommodations is requested to speak directly to the Office of Services for Students with Disabilities (SSD) (847-467-5530) and me as early as possible in the quarter (preferably within the first two weeks of class). All discussions will remain confidential.