

Chemistry of Life's Beginnings

Chemistry 120, M-F 10:40-12:40

St. Olaf College, Interim 2004

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Office hours: M 2:00-3:00 PM
T 2:00 – 3:00 PM
Th 2:00 – 3:00 PM
or by appointment

Materials you will need:

How Could Life Have Arisen on Earth? ChemConnections, Student Manual, Jasein P.G. et al. Photocopied by permission WWNorton Publishers

Limited reserve, Glasoe Science Library:

Chemistry, The Molecular Nature of Matter and Change 3rd edition, Martin Silberberg

Book 1: Origins of Life, Dyson

Book 2: Seven Clues to the Origin of Life, Cairns-Smith

Book 3: The 5th Miracle, Davies

Course description:

What is life? How could it have arisen? How did it? Can we know for sure? IN this course, you will learn chemistry fundamental to the living things of today, consider the likely environment of early earth, and study ideas about chemical change and rates in an attempt to understand the current models of the origins of life.

Course objectives:

Chemistry is a bit like learning a foreign language. Before we can travel and indulge in the sights sounds and experiences of a new land, we must first learn to communicate. This will involve learning a lot of new facts, some of which may seem a little obscure, but remember we are building communication skills in addition to learning specific items.

The goals of this course are defined on several levels. First and foremost is an increase in appreciation of the scientific process for student of the liberal arts. Other specific goals include:

- Learn the fundamentals of atomic structure, chemical bonding, oxidation states of molecules and chemical kinetics
- Learn about the structure and function of biochemical molecules relevant to facilitate life
- Develop and appreciation of the scientific method and the development of a scientific model.
- Appreciate the current debate about life's origins and develop your own views on this subject.

Class policies and philosophies:

I will be using a variety of teaching methods during our scheduled time together. Specifically, the course will emphasize a context-based, active, cooperative learning approach. This approach uses class time to work in-groups answering questions, solving problems and discussing material. My role during these cooperative sessions is to help you focus your time and organize your thoughts. I will also provide background material to supplement this discussion through a more traditional lecture format.

Attendance. Because the course relies heavily on in-class discussions, success will depend directly on regular attendance and participation

If you know you will be unable to attend class due to athletics, concert tour or other sanctioned event please makes arrangements with me ahead of time. Sudden illness and emergencies should be communicated to me via the Dean of Students office. There are no exceptions to this policy.

College policy states you must take the final exam at its scheduled time.

Out of Class Assignments. I will be assigning additional readings from the sources listed above. These sources will be on reserve in the Glasoe Science Library. We will be discussing these readings in class and the material will be covered on the exams.

Class Participation. If you have a unique insight, question, comment or issue I invite you to share it with the class. Please note there will be zero tolerance of any actions (verbal or non-verbal) that belittle each other, you or me.

Position Paper: A paper describing the position you develop on the course topic will be due the day before the final exam. The position you articulate must not be your final say on the matter but rather an explanation of your views after your brief study on the matter. Initial tentative discussions thoroughly weighing all aspects including additional insights

will be encouraged. The paper must be 5-6 pages including references. A more detailed handout will be provided later.

Office Hours: I will have an open door policy as much as possible so please drop in. Appointments are appreciated to insure privacy and efficiency. I will be using the course website, e-mail and the campus server to convey information, post solutions, give hints and tips and provide links to additional resources. Please check your e-mail daily preferably before class.

Academic Honesty: Issues of academic honesty are subject to the regulations and procedures of the Honor System and the College policy concerning plagiarism.

Grading

The point structure is as follows:

Exams 3 @ 100 points each	300
Position paper	50
Final	150
Class participation	50
Total	550

The following percentages are a guideline for grade assignment:

- 100-90 A/A-
- 89-80 B+/B/B-
- 79-70 C+/C/C-
- 69-60 D+/D/D-

Chem 120	Projected Class Schedule	January 2004
Date	Topic	Readings
1/5	Introduction/What is Life? /Life's structure and requirements	CC 1A, 1B
1/6	Building today's cell/Atomic Structure	TBA
1/7	Atomic Structure/Chemical Bonding	TBA
1/8	Oxidation States/Organic Molecules	TBA, TBA
1/9	Exam 1	
1/12	Book Discussion 1/Organic molecules	Dyson, TBA
1/13	Primordial Atmosphere/Building Blocks	CC 2A, 3A
1/14	Simulating Early Conditions/Biochemistry	CC 3D, TBA
1/15	Biochemistry/Defining Stable	TBA, CC 4A
1/16	Exam 2	
1/19	Book Discussion 2	Cairns-Smith
1/20	Graphing stability/Quantification of rates	CC 4C, 4D
1/21	Rates-concentrations/Mathematics	CC 5A, 5B
1/22	Concentration/Temperature – effects on rates	CC 5C, 6A
1/23	Exam 3	
1/26	Book discussion 3	Davies
1/27	Temperature and RNA hydrolysis/Catalysis	CC 6C, 6D
1/28	First order rate law/Aging rocks	CC 7B, 7C
1/29	Case study on funding/Putting it all together	CC 1C, 9
	Position Paper Due	
1/30	Comprehensive Final Exam	