CLFS 510 is an introductory course that reviews the conceptual underpinnings of modern biological thought. This course is a focused survey of selected biological principles and topics and their application to higher-order problems in the biological sciences. Teachers successfully completing this course will have the conceptual background and problem-solving skills necessary to undertake the College of Chemical and Life Sciences Master of Chemical and Life Sciences Program for Teachers at the University of Maryland at College Park.

- **Textbook:** Campbell, N.A., Reece, J. B., and Mitchell, L. G. Biology (5th ed.); Benjamin/Cummings Science, Menlo Park, CA., 1999. (Note, it is imperative that individuals taking this course have the CD-ROM that comes with the text.)
- **Format:** This web-based course uses a cooperative distance-learning model of directed self-exploration. However, the course is not exclusively web-based. Rather the course provides a focused survey of topics contained in the required textbook. This book and associated CD-ROM provide the informational structure of the course upon which the more advanced topics in the course are built.

The course is organized around ten concept units, grouped into two broad subject areas of five units each.

### Part I: Cell Biology, Molecular Biology and Genetics
- **Unit 1:** Macromolecules, cellular structure and membranes
- **Unit 2:** Metabolism, cellular respiration and photosynthesis
- **Unit 3:** Cell cycle and meiosis
- **Unit 4:** Mendelian genetics and chromosomal basis of inheritance
- **Unit 5:** Molecular basis of inheritance and protein synthesis

### Part II: Evolution, Ecology and Systematics
- **Unit 6:** Evolution and population genetics
- **Unit 7:** Speciation, phylogeny and systematics
- **Unit 8:** Origin of life and organismal diversity
- **Unit 9:** General, behavioral and population biology
- **Unit 10:** Community ecology, ecosystems and conservation biology

Each of the ten units within the program contains four components:
1. An introduction that provides the overall objectives and framework for the unit
2. A list of key terms necessary to comprehend the material covered in the unit
3. A list of key concepts, taken from the text, the course CD-ROM and selected web sites, that must be mastered during the course of the unit
4. A set of three or four discussion topics that require the application of concepts from this unit and their underlying linkages to current biological research. While all of these questions are relevant to the topics being discussed, only one or two need be submitted for grading (see below). Each unit should take one week to complete.

At the end of every unit, each student will electronically submit his/her written responses to one of the unit discussion topics for grading. The grade for each answer will be based on the written response. Access to the subsequent unit is contingent upon submission of answers to one of the current discussion questions.

**Evaluation and Grading**
The total number of topic questions you are required to answer over the course of the semester is 16. As stated above, one of these must be from each of the 10 topic areas, and the other six can be from any topic area you wish, with the provision that no more than two questions of the 16 can be from any one topic area, and you three of these must be from Division I of the course and three from Division II of the course. You must turn in three of the six additional topic areas from Division I of the course by the time of the mid-term examination and three from Division II of course by the time of the final.

To make this clear, please note the following:
- Each week you must submit an answer to one of the discussion questions posted for that week's unit.
- No later than the close of Unit 5, you must submit answers to three additional questions from units 1 to 5, but no more than one of these can be answers to a question from any one unit.
- No later than the close of Unit 10, you must submit answers to three additional questions from units 6 to 10, but no more than one of these can be answers to a question from any one unit.

**Evaluation and Grading**
The performance of teachers in this course is based on a combination of unit discussion topics and a final examination. As discussed above, each unit requires the electronic submission of responses to up to four assigned discussion topics based on recent biological research. Each topic is worth 10 points. The final examination consists of 50 multiple choice questions (2 points each) and 10 short essays (10 points each).

Point totals for the course are:
- Ten unit discussion topic sets (@ 40 points each) = 400 points
- Final examination = 200 points
- Total = 600 points

**Course Preparation**
The instructors for the course assume participating teachers have a basic understanding of introductory biology and inorganic chemistry. Before beginning Unit 1 of the course, teachers should
refresh their understanding of basic chemistry with the online review module contained within the course website. Chemistry concepts included within this module are:

- Chemical bonding
- Orbitals
- Energy levels
- Energy of activation
- Structure of oxygen, carbon, nitrogen, hydrogen, phosphorus, sulphur
- Entropy
- Properties of water

Also included within the review module are concepts related to the nature of scientific enquiry:

- Nature of science and biology
- Underlying assumptions of scientific research
- Difference between hypothesis and theory

Notes on the Use of ELMS for This Course
We will make extensive use of the study groups to which students will be assigned. Each group will have its own work area in ELMS in which to have discussions and prepare their answers to unit questions. Participants in one group will not be able to see the discussion of participants in other areas. However, it should be noted that the course instructors and teaching assistants will have access to all of the discussion areas.

Evaluation and Grading
Finally, a very important person for this course is Ms. Lori Davis. Lori serves as "TA" (for want of a better term) of the course and has worked closely with both of us over the years. She will be primary grader in the course, and you should anticipate a good number of interactions with her. Indeed, she is the source of a great deal of information about the mechanics of the course as well as its content, and you should be sure and introduce yourselves to her right away. Her e-mail is gladavis@comcast.net.