COURSE ABBREVIATION  BIOL 1402
CREDIT HOURS       3 Semester Hours
COURSE TITLE        CELL BIOLOGY AND GENETICS
PREREQUISITES      Exit or exemption from Learning Support English, reading, and ESL requirements.
COREQUISITE        Biol 1402L

CATALOG DESCRIPTION
Students investigate principles and applications of cell biology. Topics include the scientific method, cell structure and function, basic chemistry of life, gene structure and function, cell division, and genetics. This course is designed for non-science majors.

EXPECTED EDUCATIONAL RESULTS
As a result of completing this course, the student will be able to:
1. Explain major biological concepts and theories such as adaptation, metabolism, hierarchical organization, cell theory, and inheritance.
2. Use the scientific method as a way of investigating biological phenomena.
3. Describe basic chemistry including the structure and function of atoms, molecules, and macromolecules of living systems, and the important properties of water.
4. Discuss cell structure and function.
5. Describe the process of energy transfer in cells, i.e. photosynthesis, cellular respiration, and enzyme regulation.
6. Discuss classical genetics including cell reproduction and Mendelian inheritance.
7. Describe gene structure and function and explain the application of molecular genetics to gene technology.

GENERAL EDUCATION OUTCOMES
I. This course addresses the general education outcome relating to communications as follows:
   1. Students develop their reading comprehension skills by reading the text and additional materials as appropriate. Students are required to communicate their understanding of subject matter by responding in a literate fashion to questions on exams.
   2. Students develop their listening skills through lecture and small group discussions. Lecture material is presented that may not be included in the text or handout material and is included as part of the exams or tests.
3. Students develop their reading, writing skills, and critical analysis skills through activities developed specifically to enhance their understanding of biological principles. Students must respond appropriately to short-answer or essay type questions on course exams.

II. This course addresses the general education outcomes of mathematical concept usage and applies the scientific method as follows:
   1. Students must apply mathematical concepts in the solution of genetics problems provided to demonstrate the laws of genetics and the prediction of outcomes of genetic crosses.
   2. Students apply the scientific method in the formulation of questions, the elucidation of hypotheses and the design of experiments which illustrate the methods scientists use to find answers to the questions they ask.

COURSE CONTENT
I. Overview of Major Biological Concepts and Theories
II. Scientific Method
III. Basic and Life chemistry
   A. Atomic structure
   B. Molecular Structure
   C. Properties and relevance of water to life
   D. Structure and function of organic macromolecules
IV. Cell structure and function
   A. Cell theory
   B. Comparison of prokaryotic and eukaryotic cells
   C. Cell structures
      1. nucleus
      2. organelles of endomembrane systems
      3. energy organelles
      4. cytoskeleton
      5. cell surface characteristics
   D. Cell function
      1. Fluid-mosaic model of plasma membrane
      2. Molecular movement into and out of cell
      3. Nature of energy
      4. Cellular metabolism
      5. Chloroplast structure and function
      6. Relationship of light to photosynthetic carbohydrate formation
      7. Relationship of ATP formation and cellular respiration
      8. Binary fission and mitosis
      9. Cell division - binary fission, mitosis, and meiosis
E. Genetics
   1. Mendelian patterns of inheritance
   2. Factors complicating Mendelian inheritance
   3. Sexual reproduction and variation
   4. Mutation
   5. Human genetic disorders
   6. DNA and RNA structure
   7. The Central Dogma
   8. Genetic engineering

ASSESSMENT OF EXPECTED EDUCATIONAL RESULTS
A. COURSE GRADE
   1. Exams and a final exam prepared by individual instructors will be used to determine the course grade.
   2. In addition to objective questions, exams including the final exam will contain questions requiring the student to write answers based on the course content listed above.

B. DEPARTMENTAL ASSESSMENT
   Biol 1402 will be assessed by regular consultation between instructors and other members of the Transfer Biology Committee.

   An assessment test will be administered to all students enrolled in Biol 1402 every five years. Portfolio assessment of students' writing on final exams may be included in the assessment process.

C. USE OF ASSESSMENT FINDINGS
   Instructors will consult the assessment results and each other to determine which educational approaches are working well, and which could be improved. They will continue what works and explore improved approaches to instruction where that is needed.

EFFECTIVE DATE: August 2002
REVIEW DATE: April 2004
APPROVED DATE: September 2002