1. Catalog Description of the Course. [Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of ___ units); time distribution (Lecture ___ hours, laboratory ___ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]

CHEM 400. BIOCHEMISTRY (4)
Three hours lecture and three hours lab per week.
Prerequisite: CHEM 314 with a grade of C or better
Introduction to the physical and chemical properties of proteins and enzymes, enzymatic catalysis and inhibition, the biosynthesis of proteins and nucleic acids, and biosynthetic and metabolic pathways. Lab fee required.

2. Mode of Instruction.

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<thead>
<tr>
<th>Units</th>
<th>Hours per Unit</th>
<th>Benchmark Enrollment</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>3</td>
<td>1</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Laboratory</td>
<td>1</td>
<td>3</td>
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<tr>
<td>Activity</td>
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3. Justification and Learning Objectives for the Course. (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) [Use as much space as necessary]

This course is typically taken by students in the Biology and Environmental Science and Resource Management majors who are interested in obtaining the Chemistry minor and by students who are interested in admission to medical, veterinary, dental, or pharmacy schools. Instead of students following CHEM 311 and CHEM 312 with CHEM 318, biology students may elect to complete their chemistry requirements with CHEM 400. With an additional three units of Chemistry courses (including CHEM 346/ MGT 346/ BIOL 346 which is required by the Biology major), these students will be eligible to receive the Chemistry minor.

Students who successfully complete this course will be able to:
- Outline the development of the field of biochemistry from a historical perspective and how biochemistry has impacted society
- Describe the scientific method and how it is used to approach the study of biological molecules and biochemistry pathways
- Explain the behavior of biochemical reactions using their knowledge of thermodynamics and kinetics and the geometric and electronic structures of organic and biological molecules
- Identify the biochemical pathways responsible for the synthesis and degradation of species and the regulation of the pathways.
- Describe major biochemical pathways, energy flow, and the reaction processes
- Describe the structure and properties of amino acids, proteins, enzymes, carbohydrates, nucleic acids, RNA, DNA, prostaglandins, terpenes, steroids, fatty acids, triglycerides, and phospholipids

4. Is this a General Education Course         YES  NO
If Yes, indicate GE category:

5. Course Content in Outline Form. [Be as brief as possible, but use as much space as necessary]

Introduction to Biochemistry
Chemical evolution

NEWCRSFR 9/30/02
Evolution of cells
Architecture of cells
Thermodynamics
Kinetics
Structure and properties of water

**Nucleotides and Nucleic Acids**
Nucleic acid structure and function
Sequencing of nucleic acids

**Amino Acids and Proteins**
Amino acid structure and properties
Protein purification
Protein sequencing
Protein evolution
Structure of proteins
Protein folding and stability

**Protein Function**
Hemoglobin and myoglobin
Myosin and actin
Antibodies

**Carbohydrates**
Monosaccharides and polysaccharides
Glycoproteins

**Lipids**
Classification of lipids
Organization of lipids

**Biological Membranes**
Membrane structure and assembly
Membrane proteins and their function
Transport across membranes

**Enzymatic Catalysis**
Properties and classification of enzymes
Mechanisms of enzymatic catalysis
Enzymes kinetics
Inhibition of enzymes
Regulation of enzymes

**Introduction to Metabolism**
Energy content of molecules and thermodynamics
Oxidation-reduction reactions and electrochemistry

**Glucose Catabolism**
Glycolysis
Pentose phosphate pathway

**Glycogen Metabolism and Gluconeogenesis**
Glycogen degradation and synthesis
Regulation of glycogen synthesis and regulation
Gluconeogenesis

**Citric Acid Cycle**
Enzymes in the Citric Acid Cycle
Regulation in the Citric Acid Cycle

**Electron-Transport and Oxidative Phosphorylation**
Electron-transport
Oxidative phosphorylation and regulation

**Photosynthesis**

**Lipid Metabolism**
Fatty acid synthesis and degradation
Regulation of fatty acid synthesis and degradation
Membrane lipid synthesis

**Amino Acid Metabolism**
Protein degradation
Synthesis and degradation of amino acids

**Nucleic Acid Structure and Function**
DNA and RNA structure
DNA replication and repair
Transcription
Translation

6. References. [Provide 3 - 5 references on which this course is based and/or support it.]

Stryer, L. Biochemistry, 4th Ed., 1995

7. List Faculty Qualified to Teach This Course.

Dr. Philip Hampton
Dr. Louise Lutze-Mann

8. Frequency.
a. Projected semesters to be offered: Fall ___ X ___ Spring _____ Summer _____

9. New Resources Required.
None.

10. Consultation.
Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

________________________________________________________________________
Proposer of Course    Date