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.

**BIOL 431. BIOINFORMATICS (4)**

Four hour lecture in the lab per week.

Prerequisites: CHEM 318 or 400; BIOL 400 with a grade of C or better.

The rapid expansion of data acquisition for the human genome and proteome has huge implications for our understanding of the most fundamental processes that direct human life. An understanding of the methodologies used to acquire, store and analyse these databases is of great value for students choosing to pursue careers in molecular biology, genetics and biotechnology. Topics include: regulating the genome, including epigenetic mechanisms, the human genome project, including the clinical genetics databases, bioinformatics tools and databases, identifying functional and structural sequence elements, analysis of gene expression: microarrays and other tools. A lab fee is required.

GenEd ID: B2, B4, and Interdisciplinary

2. **Mode of Instruction.**

<table>
<thead>
<tr>
<th>Units</th>
<th>Hours per Unit</th>
<th>Benchmark Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 is an elective course for Biology majors. An understanding of the methodologies used to acquire, store and analyse these databases is of great value for students choosing to pursue careers in molecular biology, genetics and biotechnology.

Students completing this class should be equipped with the knowledge and skills to:

- Describe the flow and regulation of biological information
- Describe the techniques used to collect sequence and expression data
- Identify appropriate biological data bases for specific analyses
- Manipulate on-line resources appropriately
- Analyse gene expression and interpret its significance
- Manage bioinformatics tools
- Apply appropriate statistical methods to determine sequence similarities

4. **Is this a General Education Course**

<table>
<thead>
<tr>
<th>If Yes, indicate GE category:</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (English Language, Communication, Critical Thinking)</td>
<td></td>
</tr>
<tr>
<td>B (Mathematics &amp; Sciences)</td>
<td>B2, B4</td>
</tr>
<tr>
<td>C (Fine Arts, Literature, Languages &amp; Cultures)</td>
<td></td>
</tr>
<tr>
<td>D (Social Perspectives)</td>
<td></td>
</tr>
</tbody>
</table>
5. **Course Content in Outline Form.** *Be as brief as possible, but use as much space as necessary*

1. Introduction
2. Cell and molecular biology
3. Regulating the genome, including epigenetic mechanisms
4. Human genome project, including the clinical genetics databases
5. Bioinformatics tools and databases
6. The genome database: analysis and similarity searching
7. Identifying functional and structural sequence elements
8. Analysis of gene expression: microarrays and other tools

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


7. **List Faculty Qualified to Teach This Course.**

   Biology faculty with expertise in Bioinformatics.

8. **Frequency.**

   a. Projected semesters to be offered: Fall __X__ Spring __X__ 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