I. Course Title
   • Molecular Biology

II. Course Prefix/Number
   • CHEM 476

III. Credit Hours
   • 4.0

IV. Prerequisites
   • Completion of (BIOL 321, 323, 325, 332) each with a C or better, and Biochemistry I (CHEM 401) with grades of C or better.

V. Catalog Description
   • An introduction to the study of nucleic acids, genomes and molecular mechanisms with emphasis on genome organization, gene expression, and the techniques used in the study of molecular biology. Laboratory exercises will include standard methodologies such as restriction mapping, cloning, hybridization, DNA libraries, and PCR. Senior standing is recommended. Course includes 3 hours of lecture and 4 hours of laboratory per week.

VI. Curricular Relationships
   • This course is designed for those students majoring in biology or biochemistry and whose interest is in the health professions, molecular or biochemical research, botany, or zoology. This includes students pursuing any of the following degree tracks: BS Biology/Cellular and Molecular, BS Biology/Organismal, or BS Chemistry/Biochemistry.

VII. Student Learning Outcomes
   Upon successful completion of the course, the student will be able to:
   • demonstrate an understanding of molecular genetics as it pertains to the expression of genes in prokaryotes and eukaryotes.
   • describe the properties of DNA and the influence of environment on DNA structure.
   • list the similarities and differences of genomes from major organismal groups.
   • describe the current techniques for mapping, sequencing, and analyzing genomes.
   • demonstrate an appreciation for the potential misuse of genomic information.
   • employ proper laboratory skills using the current methodologies for handling and manipulating DNA.
VIII. **Content Outline**

- Genomes, Transcriptomes and Proteomes
  1. DNA Properties and The Human Genome
  2. Genome Anatomies
  3. Transcriptomes and Proteomes
- Studying Genomes
  1. Studying DNA
  2. Mapping Genomes
  3. Sequencing Genomes
  4. Understanding a Genome Sequence
- How Genomes Function
  1. Accessing the Genome
  2. Assembly of the Transcription Initiation Complex
  3. Synthesis and Processing of RNA
  4. Synthesis and Processing of the Proteome
  5. Regulation of Genome Activity
- How Genomes Replicate and Evolve
  1. Genome Replication
  2. How Genomes Evolve

IX. **Course Procedures/Policies/Grading Scale**

- Course includes 3 hours of lecture and 3 hours of laboratory per week.
- The lab is an integral part of this course, therefore the student’s lab performance will be included as approximately 25% of their overall grade for the course.
- Grades will be determined on the basis of objective, performance-based criteria. Letter grade equivalents are as follows:

<table>
<thead>
<tr>
<th>Percentage of total points</th>
<th>Letter grade equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>A</td>
</tr>
<tr>
<td>80-89</td>
<td>B</td>
</tr>
<tr>
<td>70-79</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
</tr>
<tr>
<td>⩽ 59</td>
<td>F</td>
</tr>
</tbody>
</table>

X. **Required/Recommended Readings**

- The following textbooks are required:

XI. **Issues Unique to this Course**

- A laboratory fee is required for this course.
• Students should expect to spend an additional 1-2 hours per week outside of the scheduled laboratory period for completing the laboratory exercises.

• Senior standing is recommended.

• This course is a cross-listing of BIOL 476 and is taught by faculty from Biology.

XII. Additional Departmental Issues

• Students in Molecular Biology will be required to comply with all General Departmental and/or College Policies as articulated in the standard policy statement included in all Biology course syllabi.