INSTRUCTOR: Neena Philips, PhD
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Office Hours: Monday and Thursday 4-5pm
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Email: nphilips@fd.edu
School Location: Dickinson Hall, Room 4467
School Telephone: 201 692 2330
School Fax: 201 692 7349
Meeting times and Course location: W 5:25-8:00 PM; DH 2177

Course Description
Recombinant DNA technology is fundamental to molecular biotechnology that encompasses many scientific disciplines (i.e. molecular biology, microbiology, biochemistry, immunology, genetics, chemical engineering, cell biology) and generates a wide range of consumer products (i.e. crops, drugs, vaccines, diagnostics, and livestock). Topics covered are: “Molecular Biotechnology Biological Systems, Gene Regulation, Recombinant DNA Technology, Chemical Synthesis, Sequencing, and Amplification of DNA, Manipulation of Gene Expression in Prokaryotes, Heterologous Protein Production in Eukaryotic cells, Directed Mutagenesis and Protein Engineering, Molecular Diagnostics, Therapeutic Agents, Vaccines, Synthesis of Commercial Products by Recombinant Microorganisms, Large-Scale Production of Proteins from Recombinant Microorganisms, Transgenic Animals, Regulating Use of Biotechnology, Patenting Biotechnology Inventions”

Course Objectives or Goals
SONS PO: School of Natural Sciences Program Outcome
BIOL PO: Biology Program Outcome

(1) To be knowledgeable in recombinant DNA technology using prokaryotic and eukaryotic organisms and the manipulation of DNA to generate clones, examine gene regulation, and express proteins. The course includes current technical procedures for recombinant DNA technology and its applications (SONS PO 1, 5; BIOL PO 5-7).
(2) To synthesize a review paper on the application of recombinant DNA technology in science, pharmaceuticals and medicine (SONS PO 3; BIOL 2, 4).
(3) Scientific communication, written and oral formats (SONS PO 6; BIOL 1, 3).

TOPICS

<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Chapter Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Development of molecular Biology</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>2</td>
<td>DNA, RNA and protein synthesis</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>3</td>
<td>Recombinant DNA Technology</td>
<td>Chapter 3</td>
</tr>
</tbody>
</table>
## Course Outcomes:
(a) Knowledge of gene regulation, recombinant DNA technology, manipulation of gene expression in prokaryotes, manipulation of gene expression in prokaryotes, molecular diagnostics, therapeutic agents, large-scale production of proteins from recombinant microorganisms, transgenic animals, and regulating use of biotechnology (SONS PO 1, 5; BIOL PO 5-7).
(b) Application of recombinant DNA technology in research, pharmaceuticals and medicine (SONS PO 3; BIOL 2, 4)
(c) Oral and written communication (SONS PO 6; BIOL 1, 3)

## Course Requirements:
The composition of the exams is objective questions and short answers (application based). An application assignment is a review paper and its presentation, on novelties and applications of recombinant DNA technology. The review paper sections are: informative title, abstract, background information in sections, concluding paragraph, literature cited with a minimum of ten original relevant articles.

## Required Material:
Textbook

## Course Calendar:

<table>
<thead>
<tr>
<th>Class</th>
<th>Day</th>
<th>Date</th>
<th>Lecture</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Wed</td>
<td>Jan 27</td>
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<tr>
<td>2</td>
<td>Wed</td>
<td>Feb 3</td>
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<tr>
<td></td>
<td>Wed</td>
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<tr>
<td>3</td>
<td>Feb 10</td>
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<tr>
<td>4</td>
<td>Feb 17</td>
<td>Literature Review 1</td>
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<td>5</td>
<td>Feb 24</td>
<td>Exam 1</td>
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<td>6</td>
<td>Mar 3</td>
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<td>7</td>
<td>Mar 10</td>
<td>Literature Review 2</td>
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<td>8</td>
<td>Mar 17</td>
<td>Spring Break</td>
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<td>9</td>
<td>Mar 24</td>
<td>Exam 2</td>
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<td>Mar 31</td>
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<td>11</td>
<td>Apr 7</td>
<td>Literature Review 3</td>
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<td>12</td>
<td>Apr 14</td>
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<td>Apr 21</td>
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<td>14</td>
<td>Apr 28</td>
<td>Literature review 4</td>
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<td>15</td>
<td>May 5</td>
<td>Exam 3</td>
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<tr>
<td>16</td>
<td>May 12</td>
<td>Final</td>
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**Course Grading:**

**GRADING / ASSESSMENT:** Overall (total 100%)

<table>
<thead>
<tr>
<th></th>
<th>Total points</th>
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<tbody>
<tr>
<td>Exams (3) (SONS PO 1, 5; BIOL PO 5-7)</td>
<td>75</td>
</tr>
<tr>
<td>Review paper (SONS PO 3, 6; BIOL PO 1-4)</td>
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</table>

Assessment, Overall (total 100%): Grade scale (“A: 94%-100%; A-: 90%-93%; B+: 87%-89%; B: 84%-86%; B-: 80-83%; C+: 77-79%; C: 74%-76%; C-: 70-73%; D: 65%-69%; F: Below 65%”)

**Learning Outcomes Assessment**

**Outcome a**

Knowledge, Comprehension and Application of Concepts: (SONS PO 1, 5; BIOL PO 5-7)

Three Exams: 75% of final grade (Each Exam weight is 25%)

<table>
<thead>
<tr>
<th>A (Excellent)</th>
<th>B (Good)</th>
<th>C (Fair)</th>
<th>&lt;C (Inadequate)</th>
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</table>

**Outcomes b, c**

Accessing and comprehending original research and review articles. Information integration and synthesis. Scientific writing and communication (SONS PO 3, 6)

Review Paper: 25% of final grade

1. Thesis Statement (4%)

<table>
<thead>
<tr>
<th>A (90-100%:Excellent) Clear and concise Informative</th>
<th>B (80-89%:Good) Descriptive</th>
<th>C (70-79%:Fair) Diffuse and Descriptive</th>
<th>&lt;C &lt;70% uncertain lacking in direction</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

2. Content (15%): Background, details, organization

<table>
<thead>
<tr>
<th>A (90-100%:Excellent)</th>
<th>B (80-89%:Good)</th>
<th>C (70-79%:Fair)</th>
<th>&lt;C &lt;70%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Relevant details</td>
<td>Correct information</td>
<td>Correct information</td>
<td>Vague discussion, unclear, confusing, no direction</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------</td>
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<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Organized thesis development</td>
<td>Descriptive thesis development</td>
<td>Lacks thesis development</td>
<td></td>
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</tbody>
</table>

3. Conclusion/Insight (4%)

| A (90-100%:Excellent) Conclusion integrates content and thesis statement. States alternate hypotheses. | B (80-89%:Good) Conclusion appropriate to content. | C (70-79%:Fair) Lacks in-depth information analysis or thesis integration | <C (<70%: Weak conclusion, no integration of content. No insight or analysis. |

4. Format, references (2%)


**Biol 6720 Spring 2010 Learning Outcomes Assessment Summary:**

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Scientific Process</th>
</tr>
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<tbody>
<tr>
<td>SONS PO 1, 5</td>
<td>SONS PO 3, 6</td>
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<tr>
<td>BIOL PO 5-7</td>
<td>BIOL PO 1-4</td>
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<tr>
<td>Weighted total</td>
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<tr>
<td>*Class average</td>
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<tr>
<td>*Std Dev</td>
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<tr>
<td>*Median</td>
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<tr>
<td>*High Score</td>
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<tr>
<td>*Low Score</td>
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<tr>
<td>Class size</td>
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</table>

*Represented as %