BIOL 6720: Recombinant DNA Technology. Spring 2012
School of Natural Sciences

INSTRUCTOR: Neena Philips, PhD
Office Location: Dickinson Hall, Room 4410
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Office Telephone: 201 692 6494
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School Telephone: 201 692 2330
School Fax: 201 692 7349
Meeting times and Course location: Th. 5:25-8:00 PM

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 course testing is via 2 in-class exams and one review paper. The composition of the exams is objective questions and short answers (application based). The review paper is on the real life application, significance and importance of recombinant DNA technology. The review paper sections are: informative title, abstract, an introductory paragraph on the content sections, content (technology, application, original reference, industry information) in sections, concluding paragraph (summarizing the content, and a thesis statement), literature cited. The review paper must reflect an in-depth and extensive analysis.

Required Material: Textbook
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Jan 22\text{nd}</td>
<td></td>
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<tr>
<td>Jan 29\text{th}</td>
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<tr>
<td>Feb 5\text{th}</td>
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<td>Feb 12\text{th}</td>
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<td>Feb 19\text{th}</td>
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<tr>
<td>Feb 26\text{th}</td>
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<td>Mar 4\text{th}</td>
<td>Exam 1. Draft of review paper</td>
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<tr>
<td>Mar 11\text{th}</td>
<td>\textbf{Spring Break}</td>
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<td>Mar 18\text{th}</td>
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<td>Mar 25\text{th}</td>
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<td>Apr 1\text{st}</td>
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<td>Apr 8\text{th}</td>
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<td>Apr 15\text{th}</td>
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<td>Apr 22\text{nd}</td>
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<td>Apr 29\text{th}</td>
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<td>May 6\text{th}</td>
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</table>

**Course Grading:**

GRADING / ASSESSMENT: Overall (total 100%)

<table>
<thead>
<tr>
<th></th>
<th>Total points</th>
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</thead>
<tbody>
<tr>
<td>Exams (2) (SONS PO 1, 5; BIOL PO 5-7)</td>
<td>70</td>
</tr>
<tr>
<td>Review paper (SONS PO 3, 6; BIOL PO 1-4)</td>
<td>30</td>
</tr>
</tbody>
</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)
Two Exams: 70% of final grade (Each Exam weight is 35%)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
</tr>
<tr>
<td>C</td>
<td>Fair</td>
</tr>
<tr>
<td>&lt;C</td>
<td>Inadequate</td>
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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: 30% of final grade

<table>
<thead>
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<tbody>
<tr>
<td>A</td>
<td>(90-100%):Excellent</td>
</tr>
<tr>
<td>B</td>
<td>(80-89%):Good</td>
</tr>
<tr>
<td>C</td>
<td>(70-79%):Fair</td>
</tr>
<tr>
<td>&lt;C</td>
<td>&lt;70% unclear lacking in direction</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Informative</td>
</tr>
<tr>
<td>B</td>
<td>Descriptive</td>
</tr>
<tr>
<td>C</td>
<td>Diffuse and Descriptive</td>
</tr>
<tr>
<td>&lt;C</td>
<td>uninformative”</td>
</tr>
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</table>
2. Content: in-depth analysis of technology and application and benefit

<table>
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<tr>
<th>Score Range</th>
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<tbody>
<tr>
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<td>Fair</td>
</tr>
<tr>
<td>&lt;70%</td>
<td>Weak</td>
</tr>
</tbody>
</table>

### Relevant details
- A (90-100%: Excellent)
- B (80-89%: Good)
- C (70-79%: Fair)
- <C (<70%: Weak

Organized thesis development

- A (90-100%: Excellent)
- B (80-89%: Good)
- C (70-79%: Fair)
- <C (<70%: Weak

### Conclusion: summary and thesis statement

<table>
<thead>
<tr>
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<tr>
<td>90-100%</td>
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<td>70-79%</td>
<td>Fair</td>
</tr>
<tr>
<td>&lt;70%</td>
<td>Weak</td>
</tr>
</tbody>
</table>

A (90-100%: Excellent)
- Conclusion integrates content and thesis statement. States alternate hypotheses.
- B (80-89%: Good)
- C (70-79%: Fair)
- <C (<70%: Weak

### Format, references (2%)

<table>
<thead>
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<td>Fair</td>
</tr>
<tr>
<td>&lt;70%</td>
<td>Weak</td>
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</table>

A (90-100%: Excellent)
- Proper formatting, including references. Prescribed length. References match content/thesis.
- B (80-89%: Good)
- C (70-79%: Fair)
- <C (<70%: Weak

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

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Scientific Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>SONS PO 1, 5</td>
<td>SONS PO 3, 6</td>
</tr>
<tr>
<td>BIOL PO 5-7</td>
<td>BIOL PO 1-4</td>
</tr>
</tbody>
</table>

| Weighted total | 70 | 30 |

*Class average

*Std Dev

*Median

*High Score

*Low Score

Class size

*Represented as %