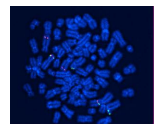


## CE 580 Biomolecular Tools for Engineers – Course Outline



**Course Objectives:** The objective of this course is to provide engineering students with the opportunity to learn cutting-edge skills in the application of biomolecular tools to environmental engineering and related engineering disciplines such as chemical engineering and biomedical engineering. By the end of this course, students should be able to carry out and understand basic qualitative and quantitative biomolecular analyses of microbial communities, including PCR, cloning, FISH, and microbial community profiling. The application of biomolecular tools to engineered systems will be a major theme.

**Meeting Times:** Monday: Readings, Lecture and Discussion, 2:10 – 3:50 PM, E112 ANAZO, Wednesday: Lab, 2:10 -5:00 PM, 314 Yates OR A310 ERC

**Instructor:** Amy Pruden

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<http://www.engr.colostate.edu/ce/homepages/pruden/index.shtml>

Office phone: 491-6670 (campus), 491-8814 (ERC, voicemail)

Office: A207D ENG, 309A ERC

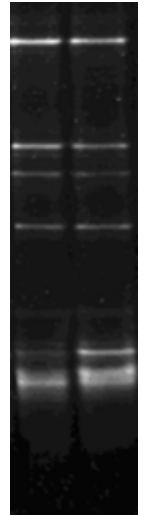
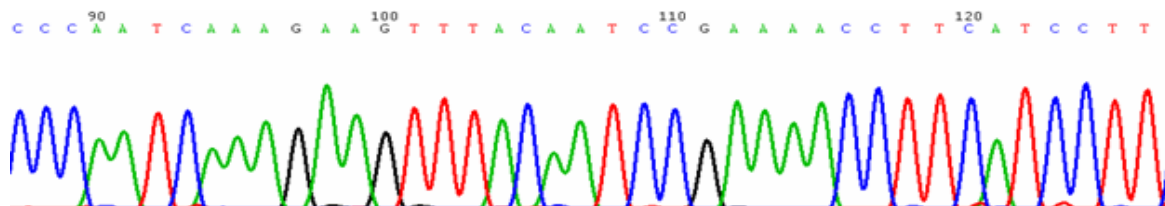
**Office Hours:** TBA.

**TA:** Luciana Pereyra, [pereyra@engr.colostate.edu](mailto:pereyra@engr.colostate.edu), 491-8647

**Text:** No required text for this course. Students will be required to purchase a lab notebook/journal and are recommended to purchase a 3” binder to organize course materials. Lab protocols will be provided and readings will be assigned.

**Course Format:** *Mondays* will be dedicated to a short lecture followed by class discussion and student presentations of readings. Each student will be assigned one article to read and present to the class during the semester (powerpoint required). All other students are expected to read the articles prior to the class period and to prepare at least three thoughtful questions for discussion. *Wednesdays* provide the opportunity to learn the methods “hands-on.” Students will be paired up into teams of two and will choose a sample of engineering relevance to work on for the semester. Students should be familiar with the protocols before the lab meeting time. All students must keep a detailed lab notebook recording what is done in the lab.

**Evaluation:** There will be three quizzes, a final exam, and one final group lab report. The lab report should summarize the findings in the format of a journal manuscript (Students may choose a journal of choice relevant to their fields). The total manuscript should not be more than 20 pages double-spaced, and should represent a “team effort”. Class presentations and overall participation (more than “showing up”) will also comprise a significant portion of the final grade.



**Grading:**

	<b>Percent Total Grade:</b>
<b>Class Discussion/Participation:</b>	10%
<b>Class Presentations (1):</b>	15%
<b>Final Lab Report (Team):</b>	25%
<b>Quizzes (3):</b>	25%
<b>Final Exam (Take Home):</b>	25%
	100%

**Summary of Topics to be covered (schedule is subject to change):**

<b>DATE</b>	<b>TOPIC</b>
<i>Mon. Aug. 21</i>	<i>Introduction, Lecture / Discussion Microbial Diversity, Video, Pre-test.</i>
Weds. Aug. 22	Lab- DNA Extraction (314 Yates)
<i>Mon. Aug. 28</i>	<i>Nucleic Acid Extraction</i>
Weds. Aug. 30	Lab- Gel Electrophoresis and DNA Quantification (314 Yates)
<b>Mon. Sept. 4</b>	<b>Labor Day- No class</b>
Weds. Sept. 6	Lab- PCR I- Preparation for DGGE (314 Yates)
<i>Mon. Sept. 11</i>	<i>Lecture / Discussion- Polymerase Chain Reaction (PCR)</i>
Weds. Sept. 13	Denaturing Gradient Gel Electrophoresis (DGGE) (314 Yates)
<i>Mon. Sept. 18</i>	<i>Lecture / Discussion- Community Profiling Techniques Part I</i>
Weds. Sept. 20	Lab- PCR II- Preparation for Cloning and SSCP (314 Yates)
<i>Mon. Sept. 25</i>	<i>Lecture / Discussion- Community Profiling Techniques Part II</i>
Weds. Sept. 27	Cloning I- Preparing and Growing Clones (314 Yates)
<i>Mon. Oct. 2</i>	<i>Lecture / Discussion- Community Profiling Techniques Part III (Quiz #1)</i>
Weds. Oct. 4	Cloning II- Clone Screening, Sequence and SSCP Preparation (314 Yates)
<i>Mon. Oct. 9</i>	<i>Guest Lectures – Engineering Applications I and Quantitative Techniques I</i>
Weds. Oct. 11	SSCP Capillary Electrophoresis (A310 ERC)
<i>Mon. Oct. 16</i>	<i>Lecture / Discussion- Quantitative Techniques Part II</i>
Weds. Oct. 18	Sequence Analysis (A210 ERC- Computer Classroom)
<i>Mon. Oct. 23</i>	<i>Lecture / Discussion- Functional Genes and Genomics I</i>
Weds. Oct. 25	Fluorescence In-situ Hybridization (FISH) I (A310 ERC)
<i>Mon. Oct. 30</i>	<i>Guest Lecture / Discussion- Engineering Applications II (Quiz #2)</i>
Weds. Nov. 1	FISH II (A310 ERC)
<i>Mon. Nov. 6</i>	<i>Lecture / Discussion- Functional Genes and Genomics II</i>
Weds. Nov. 8	Real-Time PCR (A310 ERC)
<i>Mon. Nov. 13</i>	<i>Guest Lecture- Microbial Proteomics (Prof. Ken Reardon)</i>
Weds. Nov. 15	Phospholipids I (314 Yates)
<b>Mon. Nov. 20</b>	<b>Fall Break</b>
<b>Weds. Nov. 22</b>	<b>Fall Break</b>
<i>Mon. Nov. 27</i>	<i>Lecture / Discussion- Alternative Analyses (PLFA, FAME)</i>
Weds. Nov. 29	Phospholipids II (314 Yates)
<i>Mon. Dec. 4</i>	<i>Lecture / Discussion- Engineering Applications III (Quiz #3)</i>
<b>Weds. Dec. 6</b>	<b>Make-up day</b>
	<b>Final Exam (Take Home)</b>