

## **Biol 4290**

### **Recombinant DNA Project Laboratory**

#### **Spring Semester, 2006**

Lectures – Section A: Monday 1-2 PM, Room 322 CE

Section B: Thursday 1-2 PM, Room 204 CE

Labs – Section A: Monday 2-6 PM and Tuesday 1-3 PM

Section B: Thursday 2-6 PM and Friday 1-3 PM

All Labs in room A105 CE

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Office Hours by Appointment

**Teaching Assistants: Samantha Parks** ([gth763q@mail.gatech.edu](mailto:gth763q@mail.gatech.edu)), A102 Cherry Emerson

**Brande Jones** ([brandejones@gatech.edu](mailto:brandejones@gatech.edu)), IPST

#### **Textbook:**

D.A. Miklos and G.A. Feyer. DNA Science. A First Course. 2d edition, Cold Spring Harbor Laboratory Press, 2003.

#### **Additional sources:**

Watson J. D., Gilman M., Witkowski J., Zoller M., Witkowski G. Recombinant DNA, W H Freeman & Co.; 2nd edition (1993)

Sambrook, J. and Russel DW. (2001) Molecular Cloning: A Laboratory Manual, 3d ed. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY.

## **Tentative Schedule.**

Week 1, 01/12	Organizational meeting Reading: DNA Science Chapter 4
Week 2, 01/19-20	No lecture, no lab Reading: DNA Science Chapter 5 (pp. 141-163), Lab Safety (pp. 317-320)
Week 3, 01/26-27	Lecture: PCR and Rapid Amplification of cDNA Ends (RACE) Reading: DNA Science Chapter 6 PCR section (pp. 192-195), Lab 3 (pp. 357-375), handouts on 5' RACE, Lab: 5' RACE Check of lab notebooks for comments
Week 4, 02/02-03	Lecture: Gene Cloning – ligation and transformation Reading: DNA Science Lab 5, Lab 9B (pp. 452-455), handouts Lab: Ligation and Transformation
Week 5, 02/09-10	Lecture: Genbank and other DNA databases Reading: DNA Science Chapter 6, handouts Lab: Colony PCR, DNA Databases and BLAST Turn in lab notebooks for grading (weeks 3-5)
Week 6, 02/16-17	Lecture: Plasmid vectors and restriction enzymes Reading: DNA Science Lab 3 (pp. 351-356), Lab 8 Lab: Plasmid isolation and restriction analysis
Week 7, 02/23-26	Lecture: Characterization of cloned genes Reading: DNA Science Chapter 5 (pp. 163-182) Lab: DNA sequence alignment and sequence analysis Begin planning for independent projects
Week 8, 03/02-03	Lecture: Modern genomic analysis Reading: Handouts Lab: Genomic DNA extraction and PCR Report due for Weeks 3-8 Turn in lab notebooks for grading (weeks 6-8) Turn in proposals for independent projects
Weeks 9-14	No Lectures Reading: Background material for independent projects Lab: Independent Projects
Week 15, 04/27-28	Oral presentations of Independent Projects Independent Project materials to be turned in to TA Notebooks to be turned to Professor Individual Project Reports to be turned to Professor

## **RULES AND REQUIREMENTS**

Students should organize into teams, with 2 students per team.

### **Equipment.**

Each group receives individual equipment, which will be shared with a group of BIOL 4290 A. The equipment you receive is your responsibility and you have to make sure that it is returned to the TA at the end of the course. *Completing an equipment checklist is required at the end of the course.* The Course Coordinator of the School of Biology may come and see you for damaged or lost units of equipment.

### **Grading.**

Report (weeks 3-8)	30%
Lab Notebooks (weeks 3-8)	20%
Independent Project lab notebook	10%
Independent Project manuscript	20%
Independent Project presentation	20%

### **Notebooks.**

Your notebooks should be handwritten (not typed) in pen, and should include original notes you take during the experiment. They are graded individually (each student is required to present his/her *own* notebook). Your notebooks should contain description of the procedures you have performed, and actual/original data. It is not necessary to rewrite the protocols (you may attach them if you wish to) in your notebooks. However, you have to outline experimental steps so that an experienced person (including yourself) should be able to trace your experiments without frequent references to the original detailed procedures. In addition, it is required that you include all the changes made (comparing to the original protocols), as well as all calculations, measurements/observations, etc.

Notebooks will be inspected for the first time during the lab period of Friday, Jan 27 for comments. They will be turned in at the end of weeks 5 and 8 and on the last day of classes, Apr 28, for grading. These notebooks are to be graded with emphasis on the recording of events in the experiments (esp. critical and usual data/observations) and on the clarity of event-procedure correspondence.

Students who want their notebooks back should make requests no later than one month after the completion of the course. Notebooks remaining beyond that point will be regarded as unwanted and discarded.

### **Report for weeks 3-8**

Each individual turns in his or her own report. This report should be typed as double-spaced manuscripts according to the format of the specific scientific journal, for example, *Journal of Biological Chemistry (JBC)*. It is recommended that you find a few examples of the papers published in this journal and use them as references. The first issue of each year usually has rules

and instructions on preparation of manuscripts; they can be found on the Web site as the Information for Contributors, too. Please note that different journals may have slightly different rules on manuscripts, even though principles are similar. You may choose a different journal than JBC as an example but you have to define which journal's rules you followed, and follow them exactly. A report generally includes the following sections: *Abstract (or Summary)*, *Introduction*, *Materials (or Experimental Procedures)*, *Results*, *Discussion*, and *References Cited*. The Results and Discussions sections could be sometimes combined, especially for simple projects. Experimental data should be presented as figures or tables with appropriate legends.

**Independent Projects** (One per team; teammates will receive the same grade for the independent project presentations)

Suggestions for Independent Projects will be given two weeks before the projects begin. You will have options to choose from. You may suggest your own mini-projects, but please remember that they have to use techniques, equipment and materials available at the Rec Lab. Projects using additional equipment or materials can be approved only if there is a research lab willing to provide the equipment, materials and guidance for such a project. A two-page project proposal outlining the objective(s) and experimental procedures should be turned in at the end of week 8.

**Final Independent Project Reports:** Each individual turns in a report the Independent Project. These reports are due by 3 PM on Friday, 04/28. These reports will be graded and contribute 20% to your final score. If your experiment didn't yield expected results, you can still get a high score if you properly address possible reasons for the failure and present reasonable strategies for correcting the problems. Your working habits will be observed in class and will be counted toward your report grades. NOTE: Individual project reports won't be returned to the students, although you may see them by appointment to learn about your errors.

Note that DNA samples you have obtained during individual projects (and by Professor's request, some of the samples obtained during weeks 3-8) should be properly marked (with sample names, dates, and your group numbers), referred to in the text and returned to TA at the same time when your reports are turned to Professor. Failure to turn in DNA samples or to properly mark them will result in severe subtractions.

**Independent Project Presentations:** Each team presents the objectives, experimental design, and results of their project, with discussion. Plan on 25 minutes per team, with slides.