Marshall University
Syllabus

Course Title/Number	IST340 DNA Technology
Semester/Year	**FALL SEMESTER 2014**
Days/Time	MWF 1-2:50
Location	Byrd Biotechnology Science Center 211
Phone	304-696-3515 Cell Phone # given in Class and is in MU Online
E-Mail	murraye@marshall.edu
Office/Hours	Office hours: T/Th 9-11; M/W 9-10 and by appt. I may be in BBSC 211 (lab) so call or text my cell phone given in class. Please give your name and class time if you text me so I know who you are
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802
	Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment
Phone	304-696-3515 Cell Phone # given in Class and is in MU Online
E-Mail	murraye@marshall.edu

Course Description: From Catalog

IST 340 DNA Technology: Hands-on course using genes to manufacture proteins. DNA manipulation, sequencing, cloning, library construction, screening, PCR and techniques used in biotechnology and pharmaceutical industries. (PR: IST 241 or equivalent)

Desired Objectives/Outcomes:

Required Texts, Additional Reading, and Other Materials

1. *Biotechnology DNA to Protein A Laboratory Project*. (2003) Teresa Thiel, Shirley Bissen and Eilene Lyons McGraw Hill ISBN 007241664-5 This book is available as a PDF file which will e available on the Blackboard site for the course.

2. Recommended text: Tools *and Techniques in Biomolecular Science*. Aysha Divan and Janice Royds Oxgord University Press 2013

3. Dr. Metzenberg's excellent webpage. http://escience.ws/b572/syllabus.html

4. Relevant Protocols from Current Protocols in Molecular Biology.

5. Bioinformatics web sites and software on the internet.

Course Requirements / Due Dates

1. Perform and document laboratory experiments from *Biotechnology DNA to Protein A Laboratory Project.*. Experiments will be documented throughout the semester. Laboratory grading will be collected on September 13, October 10, November 7 and December 3.

2. Flipped classroom lectures will be recorded and place in MU Online. These will assist in preparation for take home quizzes: There will be 4 take-home quizzes. You are to work independently on these quizzes.

3. Participation is critical since this is a hands-on class and the students need to learn the methods through practice. Attendance will be taken and considered in the course participation grade.

4. Scientific Literature reports. Students will perform two scientific literature reports, including a team presentation to the class and a short paper summary. These reports will be due in September 24 and November 5, 2014.

5. Final exam on Friday December 12 at 12:45.

Course Student Learning Outcomes	**How Practiced in this Course**	**How Assessed in this Course**
Students will perform laboratory experiments to characterize the alpha amylase gene as a multi-stage process.	Students will follow the protocols (with some modifications) from *Biotechnology DNA to Protein A Laboratory Project* .	Attendance and participation in laboratories.
Students will document experimental results in their electronic laboratory notebook, including well labeled data figures and conclusions.	Students will record results in laboratory notebook after performing experiments and analyzing results.	Laboratory notebook
Students will analyze two scientific papers using a ten point checklist. Students will present a critical summary as part of three person team and write an individual critical summary of the paper.	Scientific article assignment	Scientific article assignment
Students will demonstrate knowledge of DNA technology, organization and regulation of prokaryote and eukaryote genes, DNA replication, RNA transcription, Protein Translation, Bioinformatics, Recombinant DNA, Vectors and Enzymes used in DNA Cloning, PCR, DNA Sequencing, Enzyme assays, Antibody applications and Southern and Western Blotting, Protein purification	Reading *Biotechnology DNA to Protein A Laboratory Project,* in class instruction, Blackboard content, chapter problem sets	Attendance and participation in laboratories , take home quizzes, Chapter problem sets, and final exam

Grading Policy

Evaluation/Measurement of Learner Outcomes:

Quizzes and Exams: 300 pts.

Learners will be expected to read and understand the Blackboard content. This will be assessed during four take home quizzes (50 pts each, 200 pts total) and a comprehensive final exam (100 points). The goal is to link the lab concepts to the theory of molecular biology. The quizzes are either short problems and essay questions and the final will also include multiple choice/true false questions. The final will be given on December 12 2014 at 2:45.

Reading the scientific literature: 200 pts.

It is fundamentally important to learn to critically read and discuss the scientific literature. Students will read scientific papers on alpha amylase somewhat similar to the work we are performing in la and make a short team presentation in class and a short review paper you write independent of your team, due 1 week after the class presentation. There will be two sets of papers- one on DNA purification, one on cloning alpha amylases. The class presentation is a team grade of 50 points per paper and the individual paper is 50 points.

•**Lab: 500 pts**

Lab will be evaluated in the following manner:

1. Prompt attendance and team participation (50 pts). You can't learn much if you aren't here, and it is not feasible to make up labs. If you are a regular attender and work with your team to clean up your work station and keep organized, you will get all 50 points. However, **if you skip >3 labs without a University excuse, your grade in lab will drop by one letter. If you skip >6 labs, it will drop by two letters and so on**. I keep attendance. The data and experiments will be performed by a mixture of teams and individuals- you may purify your own DNA and then run it on a team gel, for example. The analysis of data will be individually performed, unless I specify otherwise.

2. Lab notebook and data analysis (300 pts). After we perform labs, I will have the results turned in individually as labeled figures for a laboratory report. **You need to produce quality data- so some experiments may be performed twice.** I will heck your laboratory notebook via LabArchives.

3. Chapter problems and exercises. (100 pts) I have some bioinformatics exercises and lab problems related to the work we do in lab. These will be due 1 week after assigned. Results will be posted in the lab notebook.

4. Lab safety and cleanliness (50 pts). You can lose points for unsafe behavior and lack of cleaning up after yourself. If you are an exceptional lab citizen, your grade will reflect this.

Final grade scale:

A = 90-100% Excellent work, goes significantly beyond assignment requirements.

B = 80 89% Good work, meets or exceeds all of the requirements of the assignment.

C = 70 79% Average work, which meets requirements of the assignment.

D = 60 69% Below average work, fails to meet one or more assignment requirements.

F = Below 60% Unacceptable work which fails to meet the minimum standards.

Point Breakdown:

Quizzes	200 pts
Final Exam	100 pts
Class Presentations	100 pts
Written summaries	100 pts
Laboratory	500 pts
Total	1000 pts

Statement on Academic Dishonesty

All assignments must be the student's own original work. All information and ideas drawn from other sources must be properly acknowledged. Submitting an assignment which is not the student's original and independent work will result in a reduced or failing grade (recorded as a zero) for the assignment. It may result in more serious sanctions, up to and including failure of the course and further sanctions.
If you are ever unsure whether something constitutes academic dishonesty, you should consult with the course instructor before the assignment is graded.
The policy on Academic Dishonesty will be followed in the course as listed in the current Catalog.

Attendance Policy

Class Participation: A central part of this course is participation in laboratory experiments. In order to participate effectively in the course, it is essential to read the laboratory protocol before class.

Attendance: Is essential given the interactive nature of this course and the importance of lab work. If a student skips >3 labs without a University excuse, the grade in lab will drop by one letter. If the student skips >6 labs, it will drop by two letters and so on. Missing labs will only be allowed with a university approved absence. Habitual lateness will also be penalized.

Reading Assignments and Flipped Lectures: Students are expected to complete the reading for each class before class starts. Students are expected to listen to flipped content lectures to prepare for each quiz.

Lateness Policy: This class is preparation for the professional world you will all be entering. You will be expected to turn in assignments and complete presentations on the day you are scheduled. Unless the absence is a University-excused one, late assignments will be penalized one grade a day.

Course Schedule
IST 340 DNA Technology – Semester Schedule is approximate since lab experiments may take longer than anticipated. Experiments will be repeated if necessary

Week 1 Intro to lab safety, Genetic engineering regulations, Biosafety, pipetting exercise, Learning how to present Data in figures and write figure legends; Keeping a lab notebook, PCR optimization. Introduction to PCR **Read PCR lab experiment**

Week 2 **PCR Optimization experiments**

Week 3 Enzyme assays of Saliva and purified enzymes, Protein concentration assays of Saliva, calculating specific enzyme activity **Read Chapter 2**

Week 4 Compare enzymes under different temperatures and pH conditions **Read Chapter 3**

Week 5 Purifying human DNA, Presentation of Technical papers **Read Chapter 7**

Week 6 10/1 Purifying DNA from Bacteria; Estimating DNA concentration; Agarose gel to assess DNA quality, Real-time PCR experiments on human DNA.

Week 7 10/8 PCR **Read Chapter 8** Midterm October 9

Week 8 10/15 Digest Genomic DNA and run Southern Blots **Read Chapter 9**

Week 9` Quest for lab on Monday October 20. Protein Gels, Western Blots **Read Chapter 5**

Week 10 Plasmid vector digestion and recombinant DNA **Read Chapter 10**

Week 11 11/5 Analysis of clones **Read Chapter 11 Presentation of Paper 2 on Nov. 9**

Week 12 11/12 Analysis of clones

Week 13 **M 11/19-F 11/23 THANKSGIVING BREAK**

Week 14 11/27 Analysis of clones

Week 15 12/3 Enzyme analysis of clones **Read Chapter 12**

Week 16 Final exam

Dr. Murray's Class Schedule

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8					
9	office	office	office	office	
10	IST 444 10-11		IST 444 10-11		IST 444 10-11
11					
12		IST 120		IST 120	Faculty Meeting
1	IST 340	12:30-1:45	IST 340	12:30-1:45	IST 340
2	IST 340		IST 340		IST 340
3	1-2:45		1-2:45		1-2:45
4		IST 120	help 224	IST 120	
5		4-5:15		4-5:15	
6				help 224	