**Marshall University**

**Syllabus**

|  |  |
| --- | --- |
| Course Title/Number | IST340 DNA Technology |
| Semester/Year | **FALL SEMESTER 2015** |
| Days/Time | MWF 1-2:50 |
| Location | Byrd Biotechnology Science Center 211 |
| Phone | 304-696-3515 Cell Phone # 304-617-6198 given in Class and is in MU Online |
| E-Mail | murraye@marshall.edu |
| Office/Hours | Office hours: M-F 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](http://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 Phone304-617-6198 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 11, October 9, November 13 and December 4. 2. Flipped classroom lectures will be recorded and place in MU Online. These will assist in preparation for exams. 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 will be take home Due on Exam Date December 11 OR before. |

|  |  |  |
| --- | --- | --- |
| **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 exams, Chapter problem sets, and final exam |

**Grading Policy**

|  |
| --- |
| **Evaluation/Measurement of Learner Outcomes:**  **Quizzes and Exams: 400 pts.**  Learners will be expected to read and understand the Blackboard content. This will be assessed during midterm (200 pts total) and a comprehensive final exam (200 points). The goal is to link the lab concepts to the theory of molecular biology. The exams are either short problems, essay questions and the final will also include multiple choice/true false questions. The final will be given on December 11 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: 400 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 (200 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:  Midterm 200 pts  Final Exam 200 pts  Class Presentations 100 pts  Written summaries 100 pts  Laboratory 400 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,

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

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

**Week 4** Purifying DNA from Bacteria; Estimating DNA concentration; Agarose gel to assess DNA quality. **Read Chapter 7**

**Week 5** Presentation of Technical papers

**Week 6** PCR optimization andIntroduction to PCR **Technical paper summaries due. Read Chapter 8 and Read BABEC PCR lab experiment**

**Week 7** PCR optimization continued **Midterm October 7**

**Week 8** 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** Analysis of clones **Read Chapter 11** **Presentation of Paper 2 on Nov. 9**

**Week 12** Analysis of clones

**Week 13 THANKSGIVING BREAK**

**Week 14** Enzyme analysis of clones **Read Chapter 12**

**Week 15** Finals Week

**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** |  |