

Prerequisites - BL 101, BL 210

Instructor - Dr. Engle

Office - 211 Pierce Hall

Phone - 886-6552

Email - JEngle@mtaloy.edu

Credit Hours - 3 (3 - 2 hour labs)

Laboratory - MWF 9:00-10:50 104 Pierce Hall

Final - Day 3, W 10 Dec. 8:00-10:00

Office Hours - MWF 12:00 - 1:00 & T 12:00 - 2:00

Web page - <http://www.DrEngle.net>

Text Requirement:

No text book is required for this course. A composition book and a three ring binder are required.

Course description:

This is a laboratory course introducing students to techniques used in the modern day biotechnology laboratory. Students will gain hands on experience that can be directly used in molecular and biotechnology laboratory analysis and experimentation.

Additional course description:

This course will be run as if you are employed in a laboratory setting but with instruction. As a result you will be preparing every solution and setting up every experiment on your own. The instructor is available for assistance but the instructor will not be preparing reagents for you. You may have to work in lab beyond the schedule times to complete or prepare experiments.

Grading:

1. Homework 20% of grade.
 - Various assignments will be given through out the semester that must be turned in by the date due.
2. Laboratory notebooks. 40% of grade.
 - *Composition Book*
 - You are required to keep a laboratory notebook organized by date.
 - This notebook should contain reference to procedures, alterations of procedures, numerical analysis, and data.
 - In other words, your laboratory notebook should contain enough information so that someone could reproduce your experiments from your notebook.
 - In addition, your laboratory notebook should record when experiments failed along with thoughts on what went wrong and how to correct the problem.
 - *Three Ring Binder*
 - Repeated experimental procedures should be kept in your notebook. At minimum it should contain step by step protocols written (condensed) by the student. It may also contain the manufacturer's protocols as well.
 - This notebook should be turned in with your composition book for grading.
3. Assessments. 20% of grade.
 - Written quizzes and lab practicals will be administered in lab. Material for the quizzes will come from lectures and readings.
 - Small five minute student presentations are required and graded.
4. Laboratory results. 20% of grade. Students must demonstrate proficiency in four laboratory procedures by producing results:
 - Preparation of culture media without contamination.
 - Isolation of measurable DNA amounts (plasmid or genomic)
 - PCR
 - Tissue culture - expand cell lines for cryogenic storage

Scale

A=100-92% B+=91-88% B=87-83% C+=82-79% C=78-74% D=73-65% F=64-0%

Other grades (E, W, WP, WF) will be assigned as described in the College Catalog.

Additional Resources:

Laboratory techniques you will do:

1. Bacterial culturing
2. PCR possible real time PCR
3. Transformation
4. Gene cloning
5. DNA harvesting, quantification, cutting and separation
6. Centrifugation
7. Tissue culture
8. Transfection
9. Recombinant protein expression
10. Protein Quantitation
11. Protein purification by column chromatography
12. Protein electrophoresis and blotting (western)

Additional techniques discussed

1. DNA sequencing
2. RNA harvesting
3. DNA (Southern) blotting
4. RNA (northern) blotting
5. DNA fingerprinting
6. Ultracentrifugation
7. Immunocytochemistry
8. ELISA

External resources:

- Ausubel, F.M., et al. 2002 Short Protocols in Molecular Biology 5th ed. Volumes 1 and 2. (A Compendium of Methods from Current Protocols in Molecular Biology). John Wiley & Sons, Inc.
- Bonifacino, J.S., et al. 2004 Short Protocols in Cell Biology (A Compendium of Methods from Current Protocols in Cell Biology). John Wiley & Sons, Inc.
- Bourgaize, D., T.R. Jewell, and R.G. Buiser. 2000. Biotechnology: Demystifying the Concepts. Benjamin Cummings, New York. 416 pp.
- Crommelin, D.J.A., R.D. Sindelar, and B. Meibohm. 2013. Pharmaceutical Biotechnology: Fundamentals and Applications 4th ed. Springer. 544 pp.
- Deutscher, M.P. 1990. Guide to Protein Purification. Methods in Enzymology Volume 182. Academic Press, Inc. New York. 894 pp.
- Gellissen, G. 2005. Production of Recombinant Proteins (Novel Microbial and Eukaryotic Expression Systems) Wiley-VCH Verlag GmbH & Co. 404 pp.
- Glazer, A.N. and H. Nikaido. 2007. Microbial Biotechnology: Fundamentals of Applied Microbiology 2^{ed}. Cambridge University Press. New York. 554 pp.
- Pfrangner, R. and R.I. Freshney. 2004. Culture of Human Tumor Cells. John Wiley & Sons Inc. Hoboken, NJ. 435 pp.
- Ratledge, C. and B. Kristiansen. 2006. Basic Biotechnology 3rd ed. Cambridge University Press. New York. 666 pp.
- Singleton, P. and D. Sainsbury. 2001. Dictionary of Microbiology and Molecular Biology 3rd ed. John Wiley & Sons, Ltd. New York. 895 pp.

In addition to the above policies and procedures, the instructor reserves the right to alter, augment, or delete from existing policies if in so doing the proper atmosphere for teaching and learning is maintained. All such policy changes will be announced.

MAC Policies

Weather Delays and Compressed Schedule

In the event of a delayed opening, MAC will follow a compressed schedule. This will provide students with the opportunity to attend all scheduled classes on delay days with each class meeting for a shorter than usual session. For the Compressed Schedule for delay days, go to the following link: <http://www.mtaloy.edu/delays-cancelations>

Technology and Communication Assistance Statement

All students are expected to regularly log in to the Canvas course website. The site contains the syllabus and assignments, and supplementary materials will be placed there on a regular basis. Furthermore, important announcements will be posted on the site (especially if a class period is canceled due to weather, illness, etc.). For assistance in using Canvas, please contact the Canvas administrator at (Canvas@mtaloy.edu).

College offices and instructors often communicate important information through the MAC email system. Students should check their school email account regularly. For technical or log-in credential questions, please contact the help desk at (helpdesk@mtaloy.edu or 814-886-6502).

College Academic Integrity Statement

Mount Aloysius College is committed to the academic integrity of the entire community. All share responsibility for maintaining high standards of academic integrity, and no forms of academic dishonesty are tolerated. Forms of academic dishonesty include but are not restricted to: giving or receiving unauthorized assistance on an examination, project, or assignment; using unauthorized forms of assistance such as crib notes or cell phones on an examination; falsification of data or plagiarism (using another person's ideas or words as your own); and lying or falsifying reasons for missing examinations or class.

A student found guilty of lying, cheating, or plagiarism, depending on the nature of the offense and the history of the student, is usually subject to one or both of the following: a grade of zero on the assignment, project, or examination or a grade of F in the course. All cases of lying, cheating, or plagiarism where a punishment is incurred are reported to the Senior Vice President of Academic Affairs, who maintains a record of all offenses. Serial offenders may be subject to suspension or dismissal.

College Accommodations Statement

Mount Aloysius College is committed to providing reasonable accommodations to students with disabilities. Students with disabilities who wish to request accommodations must contact Ms. Kimberly Washington, MA, Director of Student Success and Persistence, to formally request accommodations and provide supporting documentation. Her office is located in the Library, Room 116, (814) 886-6320. If you receive approval for accommodations, it is important that you stop by the office at the start of the semester so necessary arrangements can be made.

Attendance Policy

Attendance at all lecture and lab sessions is mandatory. It is your responsibility to notify the instructor **prior** to missing an exam or laboratory and you must have a valid reason. The instructor reserves the right to judge the validity of the excuse. If you miss an exam, you are responsible for taking the exam within one week of your return. There are no makeup labs unless you are able to come to another section during the same week and obtain instructor permission. *Failure of the student to follow the steps outlined above will result in a grade of "0" for the missed exam or lab!*

Conflict Resolution

Should a student encounter difficulty with course content or other aspects of the course, the first action should be to make an appointment to speak with the instructor. The instructor may suggest resources on campus or other tips to assist student learning. If a student has concerns with their instructor, then the best course of action is to seek out a meeting with the Science and Mathematics Department Chair, Dr. Crystal Goldyn, 814-886-6534, CGoldyn@mtaloy.edu. to discuss the difficulties. If an agreeable decision is not reached, the student should then request a meeting with the Dean, Dr. Chris Lovett, 814-886-6458, CLovett@mtaloy.edu. The Faculty, Department Chairs, and Deans are committed to treating all students with respect and fairness. Additional information is outlined in the academic grievance policy in the College catalog.

Title IX: Confidentiality and Responsible Employee Statement

Mount Aloysius College faculty are committed to creating a safe learning environment for all members of our community, free from gender and sex-based discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking, in accordance with Title IX of the Education Amendments of 1972.

Please note that the Title IX and Sexual Misconduct Policy designates all faculty members, including teaching assistants, as "Responsible Employees". Under Mount Aloysius College's policy, all "Responsible Employees" must report all disclosures of sex or gender-based discrimination or violence to Mount Aloysius' Title IX Coordinator, Ms. Tonia Gordon, Vice President for People & Mission Integration/Chief Human Resource Officer, tgordon@mtaloy.edu or 814-886-6390. The Title IX Coordinator will reach out to provide resources, support, and information after receiving a report, but community members are not required to respond to such outreach. Reported information will remain private.

If you have (or someone you know has) experienced any form of sex or gender-based discrimination or violence and wish to speak with someone *confidentially*, please contact one of our counselors at counseling@mtaloy.edu or call 814-886-6515. For more information regarding Mount Aloysius College's Title IX procedures, reporting, or support measures, please visit sites.google.com/mtaloy.edu/titleix/home.

Disclosures of gender and sex-based discrimination or violence made in relation to an assignment and/or educational prompt will not result in a referral to Mount Aloysius College's Title IX Coordinator unless requested otherwise.

Laboratory Safety Contract

Every laboratory user should observe the following rules:

1. Know the potential hazards and appropriate safety precautions before beginning work.
2. Know the location and use of emergency equipment, including safety showers, eyewash stations and safety kits.
3. Know the types of personal protective equipment available and how to use it for each procedure. Goggles must be used when there is a risk of splash, when working with Bunsen burners or when doing dissections. Disposable gloves must be used when doing dissections and must be supplied by the student. **Closed-toed shoes** should be worn at all times when using any Pierce Hall laboratory. Loose and torn clothing may pose a hazard in the laboratory. For your protection you must use clothing that is at least knee length when seated during laboratories. Wear clothing that, if damaged, would not be a serious loss, or use aprons or laboratory coats because chemicals may damage fabric.
4. Never block safety equipment or doors and keep aisles clear and free from tripping hazards.
5. Familiarize yourself with the emergency response procedures, alarms and building evacuation routes.
6. Familiarize yourself with the equipment you will be using. Pay extra care when working with glass and when using dissecting equipment, whether cutting or assisting. Take good care of equipment and report any damage to your instructor.
7. Prevent pollution by following waste disposal procedures. Chemical reactions may require traps to prevent the release of toxic substances to the laboratory or to the environment. Use fume hoods if necessary.
8. Combine reagents in the appropriate order and avoid adding solids to hot liquids.
9. Do not prepare, store or consume food or beverages in any Pierce Hall laboratory. Microwaves and refrigerators are for laboratory use only, not to heat or store food.
10. Do not smoke in any Pierce Hall laboratory.
11. Do not apply cosmetics when in the laboratory.
12. Use a pipette bulb or a mechanical pipetting device to provide a vacuum. Never use mouth suction to pipette chemicals or to start a siphon.
13. Be alert to unsafe conditions and actions and bring them to the attention of your supervisor or lab manager immediately so that corrections can be made as soon as possible. Report any injury to your instructor immediately. After dealing with the incident, instructors should fill out an incident report.

For additional information you can consult Mount Aloysius College Laboratory Chemical Hygiene Plan and the Science and Mathematics Department Safety Manual