

**BIOL 3310/PHYS 4391/CHEM 4392/GEOL 4305: Research Methods**  
Spring 2014

**Instructor:** Dr. Ramon Lopez

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**Office Hours:** 1 p.m. – 3 p.m. Mondays and by appointment

**Graduate Teaching Assistant:**

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**Additional Instructors:**

Dr. Greg Hale, Department of Chemistry & Biochemistry, 224A SH, [greg@hale.uta.edu](mailto:greg@hale.uta.edu)

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**Section Information:** BIOL 3310-31 and 3310-32, PHYS 4391-31 and 4391-32, CHEM 4392-31 and 4392-32, GEOL 4305-31 and 4305-32 (31 sections have Tuesday Lab, 32 sections have Wednesday Lab)

**Time and Place of Class Meetings:**

Lecture (both sections): Monday, 3:30-5:20 p.m., 129 Science Hall

Laboratory (section 31): Tuesday, 3:30-5:20 p.m., 226 Science Hall

Laboratory (section 32): Wednesdays, 2:00-3:50 p.m., 226 Science Hall

**Description of Course Content:** This course will enable UTeach students to experience hands-on the tools that scientists use to solve scientific problems. There will be a focus on the mathematics used by scientists in the way that scientists use it. Students will engage in designing experiments, formulating hypotheses, collecting data, using statistics, reading and evaluating the scientific literature, writing and reviewing scientific papers, and making oral presentations of scientific research.

**Student Learning Outcomes:** Students will gain experience in conducting scientific experiments, analyzing data, and giving written and oral presentations of their results. They will also be reviewing each other's presentations. Students will be immersed in the process of scientific inquiry so that when they become teachers, they will be able to instruct their own students in how to approach questions scientifically.

**Required Textbooks and Other Course Materials:**

1. *Research Methods for Science* by Michael P. Marder, 2011, Cambridge University Press. Students will be provided with a course information handout via the course's Blackboard page that will include all assignments. Additional reading will be required of literature available electronically through UT Arlington's library.
2. A lab notebook that makes carbonless copies to hand in assignments at the end of each lab session and maintain a personal copy.
3. Tk20: (If you have already purchased Tk20, you may still access the software this semester and do not need to purchase it again.) The College of Education and Health Professions has implemented Tk20, a comprehensive data management system that provides powerful tools to manage growth and streamline processes to meet your needs more efficiently and effectively. The set of tools that is required as a course text is called *TK20 HigherEd*. The following is a partial listing of what the Tk20 system will enable you to do:
  - Create your key assessments and performance artifacts online, which you will be able to access and use beyond graduation. This will enable you to present documented performance data and information to prospective employers, who are increasingly interested in data-supported evidence of an individual's current and potential performance.

- Submit forms online, including applications for field-based experiences such as student teaching, practicum, internships, or other clinical practice required for teacher or administrator certification, and receive timely notification of placement details sent to your Tk20 account.
- Create multimedia portfolios for documenting your work for presentation to faculty and prospective employers that can be exported to CDs or other media.
- Monitor your progress throughout the program and have access to a fully documented record of your program performance, creating a vested partnership between you and faculty in your progress through your academic program.

On-line tutorials and training materials will orient you to the Tk20 system and its use. For additional information, go to <http://www.uta.edu/coehp/tk20>.

**Attendance:** Attendance is mandatory and will be incorporated into the student's grade.

**Grading:** Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels. Grades will be calculated as follows:

10 pts.	Attendance, as determined by checks of active participation and submission of assignments
25 pts	Homework assignments
5 pts	Inquiry 1
2 pts	Inquiry 2 proposal
3 pts	Inquiry 2 draft
3 pts	Inquiry 2 oral presentation
10 pts	Inquiry 2 final writeup (will only be graded if preceding assignments were completed)
10 pts	Inquiry 3 writeup
2 pts	Inquiry 4 proposal
5 pts	Open Question presentation
5 pts	Inquiry 4 draft
5 pts	Inquiry 4 oral presentation
15 pts	Inquiry 4 final writeup (will only be graded if preceding assignments were completed)

Late assignments will lose 10% of the value of the assignment for each day it is late. The Inquiry final write-ups will be graded according to a rubric in your course packet. Final Inquiries must be related to the subject for which you have enrolled, e.g., if you are in BIOL 3310, your final inquiry must be a biology inquiry. There will be no exams in this course.

Final grades will be determined on a strict scale: 89.5-100 A, 79.5-89.4 B, 69.5-79.4 C, 59.5-69.4 D, 0-59.4 F.

**Descriptions of major assignments and examinations:** Students are required to complete 11 homework assignments and four major inquiries over the course of the semester that include oral or written assignments. Details are provided in the Course Information packet.

**Expectations for Out-of-Class Study:** Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 2-6 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

**Professional Dispositions. College of Education and Health Professions, approved 5/2012:** Each candidate in the College of Education and Health Professions of UT Arlington will be evaluated on Professional Dispositions by faculty and staff. These dispositions have been identified as essential for a highly-qualified professional. Instructors and program directors will work with candidates rated as "unacceptable" in one or more stated criteria. The candidate will have an opportunity to develop a plan to remediate any digressions.

## Course Schedule

Date	Topic	Project in Progress	Reading	Homework Start	Due
13 Jan	Curiosity and scientific inquiry				
Lab (1/14, 15)	Balloons: Inquiry I preparation	Inquiry I		1 (Inquiry Grading)	
27 Jan	Falling objects: Experimental design I & II		Chapters 1 & 2		Homework 1
Lab (1/28,29)	Safety, Inquiry II	Inquiry II			Inquiry I
3 Feb	Homework 1 Grading Discussion & Statistics: overview, sampling and averaging		Appendix A, Chapter 3		
Lab (2/4,4)	Graphical analysis of data: Inquiry II			2 (Excel) 3 (Human Subjects)	Inquiry II proposal
10 Feb	Statistics: standard deviation, standard error		Sample Inquiries		
Lab (1/11,12)	Inquiry II			4 (Statistics)	Homework 2 and 3
17 Feb	Statistics: distributions, Central Limit Theorem, Z tests				
Lab (2/18,19)	Inquiry II				Homework 4
24 Feb	Statistics: t tests and Scientific literature: existence and searching		Chapter 5	5 (Inquiry grading) 6 (literature search)	Inquiry II draft
Lab (2/25, 26)	Inquiry III	Inquiry III			
3 Mar	Inquiry II partner grading				Homework 5
Lab (3/4,5)	Inquiry III + $\chi^2$			7 ( $\chi^2$ )	Homework 6
17 Mar	Inquiry II presentations				
Lab (3/18,19)	Inquiry IV planning	Inquiry IV			Homework 7
24 Mar	Modeling: order of magnitude		Chapter 4	8 (Estimation)	Inquiry II Final
Lab (3/25, 26)	Inquiry IV; proposal review				Inquiry IV Proposal 1
31 Mar	Modeling: M&M's, temp			9 (M&Ms)	Inquiry III
Lab (3/8, 9)	Inquiry IV				Inquiry IV Proposal 2, Homework 8
7 Apr	Numerical modeling: equations in Excel			10 (open questions)	
Lab (3/8, 9)	Inquiry IV				Homework 9
14 Apr	Presentation prep; Inquiry IV partner discussions		Presentation articles	11 (Inquiry Grading)	Inquiry IV draft
Lab (4/15, 16)	Inquiry IV				
21 Apr	Open Question Presentations				Homework 10
Lab (4/22, 23)	Inquiry IV partner discussions				Homework 11
28 Apr	Open Question Presentations				
Lab (4/29, 30)	Inquiry IV discussions, final prep				
Final Exam Week	Inquiry IV Presentations (Tue 6 May, 3:30-5:30 Section 31, Wed 7 Dec 2-3:50 Section 32)				Inquiry IV Final

*As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Dr. Ramon Lopez*

**Grade Grievances:** Instructors will re-evaluate a grade provided it is brought to our attention within one week of the assignment being returned. Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog.

**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/ses/fao>).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability) or by calling the Office for Students with Disabilities at (817) 272-3364.

**Academic Integrity:** All students in this course are expected to adhere to the UT Arlington Honor Code:

*I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

*I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

Instructors may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at [www.uta.edu/resources](http://www.uta.edu/resources).

**Mandatory Online Lab Safety Training:** **Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities.** There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

1. Go to <http://www.uta.edu/training>.
2. Log on using your network log-on ID and password (what you use to access email). If you do not know your NetID or need to reset your password, visit <https://webapps.uta.edu/oit/selfservice/>.
3. The available courses for completion will be listed under "Training I'm Enrolled In". Complete the course entitled 'Student Lab Safety Training – General.' \*\*\*NOTE: If you completed Wet, Dry or Biology Lab Safety

Training course last semester for another class, that training is still applicable until the end of this academic year. Please follow instructions in #4 to print the certification page for your TA.

4. Go to 'Training I've Completed' and print the displayed page for your TA. Verify that it shows clearly your name, and that 'General, Wet, Dry or Biology' training is completed/passed and the date when the training was completed. If you have just completed the training but it is not updated on the 'Training I've Completed' page, please log out of the system and log back in. If the training still does not show up on this page, call the Helpline at 817-272-5100.

5. If you were enrolled in a course with a lab last semester and did not complete the training or if you do not see training for this academic year, email [compliance@uta.edu](mailto:compliance@uta.edu) providing your name, a contact phone number, NetID and course (e.g. BIOL 1441-005) to request the appropriate training for your course.

6. Students who have not completed the training by census date may be dropped from the lab (and consequently the lecture).

7. Lab Safety Training is required to be completed once every academic year. Training completed in the Fall semester is valid for Fall, Spring and Summer sessions. It is your responsibility to print your training certification page and turn it in each semester to your TA for each course with a lab you are enrolled in.

*For training specific questions, contact the Environmental Health and Safety office at 817-272-2185.*

*For technical assistance with the training, please contact the Office of Institutional Compliance at 817-272-5100 or email [compliance@uta.edu](mailto:compliance@uta.edu)*

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency during lecture that requires us to vacate the building, students should exit the room, turn right, and exit the building. During labs, students should exit the room, turn right walk to the stairwell, and exit the building on the first. In case of tornados, continue to the basement and enter room 010, which is my lab. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.