

PHYS 4301-02: DATA REDUCTION

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Office Hours: MW 3:30 – 4:30 PM (or by appointment)

REQUIRED COURSE TEXTBOOK: *Data Reduction and Error Analysis for the Physical Sciences*, 3rd edition (2003) by Philip R. Bevington and D. Keith Robinson
You will find this text a highly valued reference book throughout your days in college and beyond.

LECTURE: MWF 9:10-10:05 AM in Archer 114

CLASS WEB SITE: <https://luonline.blackboard.com/>

STUDENT LEARNING OUTCOMES: During the course of this semester, students will

1. Develop skills in the **management of data**, e.g. collected in experiments.
2. Improve their ability to **represent data** in forms most useful for analysis.
3. Advance skills in **data analysis**, learn methods of fitting functions to data, and determine the level of agreement between the function and the data.
4. Refine error analysis skills to obtain **estimates of uncertainty** in values calculated from measured quantities.
5. Deepen understanding of the **meaning and significance** of uncertainties quoted in measured quantities.
6. Expand their talent for describing results in terms that properly reflect what one can **legitimately claim** on the basis of data analysis and estimated uncertainties.

GRADE: Course grades will be based on the following measures with **approximate weights** as shown.

Assignments	70%
Quizzes (3)	30%

Course letter grades will be assigned using the following **approximate** scale:

A: 88 – 100% B: 75 – 88% C: 63 – 75% D: 50 – 63% F: < 50%

HOMEWORK: An assignment will be given each week outlining the subject material to be learned and the problems to be worked out and turned in. Assignments are due at 5:00 PM on the due date. **No late assignments will be accepted.**

QUIZZES: There will be three quizzes during the semester, the dates of which will be announced in advance. Specific instructions concerning quizzes will be provided.

INCOMPLETE GRADES: The grade of "I" may be given when any requirement of the course, including the final examination, is not completed. Arrangements to complete deficiencies in a course should be made with the instructor prior to the end of the semester or term. Incomplete work must be finished during the next long semester or the Records Office will change the "I" to the grade of "F." While the extension may be granted by the instructor with the approval of his/her Department Chair and Academic Dean, once the "I" is changed to an "F" it cannot be changed back to an "I." In this case, either a "change of grade" procedure must be initiated or the course must then be repeated if credit is desired. The instructor may record the grade of "F" for a student who is absent from the final examinations and is not passing the course.

DROP POLICY:

Please make note of the three dates indicated in this drop policy. Any drop will be your responsibility; I will not drop a student from the course.

January 31, 2018: (Census Date-Six Drop Rule does not apply) A student may drop or withdraw without consulting with the instructor. The Six Drop Rule does not apply to a drop before 5:00 PM.

February 19, 2018: (Six Drop Rule applies) A student may drop or withdraw from the course without academic penalty and receive a Q, however, the Six Drop Rule applies. The student will consult with the instructor and the Records Office to initiate a drop.

April 4, 2018: (Six Drop Rule applies) Last day to drop or withdraw with academic penalty; the student must be passing the course at the time of the requested drop in order to receive a Q. The drop form, including all required signatures, must arrive in the Records Office by no later than 4:00 PM. No drop is allowed after this date except in extreme extenuating circumstances. Any "late drop" must be approved by the instructor, department chair, college dean, and provost.

**ACCOMMODATIONS
THROUGH THE
DISABILITY
RESOURCE CENTER:**

Lamar University is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is located in the Communications building room 105. Office staff collaborate with students who have disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact the DRC at [409-880-8347](tel:409-880-8347) or drc@lamar.edu to arrange a confidential appointment with the Director of the DRC to explore possible options regarding equitable access and reasonable accommodations. If you are registered with DRC and have a current letter requesting reasonable accommodations, we encourage you to contact your instructor early in the semester to review how the accommodations will be applied in the course. <http://www.lamar.edu/disability-resource-center/>

**ACADEMIC
INTEGRITY:**

Students are expected to maintain complete honesty and integrity in their academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. Students are specifically warned against all forms of cheating and plagiarism. The *Lamar University Student Handbook* clearly reads: "Any student found guilty of academic dishonesty in any phase of academic work will be subjected to disciplinary action. Punishable offenses include, but are not limited to, cheating on an examination or academic work which is to be submitted, plagiarism, collusion, and the abuse of source materials." One aspect of the *Handbook's* definition of cheating includes "purchasing or otherwise acquiring and submitting as one's own work any research paper or other writing assignment prepared by an individual or firm." Plagiarism is defined as "the appropriation and the unacknowledged incorporation of another's work or ideas into one's own and submitted for credit." Faculty members in the College of arts and Sciences investigate all cases of suspected plagiarism. Any student who is found cheating in this course will receive a course grade of F.
<http://students.lamar.edu/student-handbook.html>

For quizzes, students will be given specific instructions concerning authorized resources. Students are encouraged to **discuss** the subject matter and homework assignment with other students in class. ***It is a violation of the Lamar University Academic Honesty Policy to copy the work of another student, past or present.*** Furthermore, for study groups, it is not acceptable for students to copy commonly derived answers word-for-word for each group member. Each answer should be written out ***in the student's own words*** (and equations), not in those of the group. When using a spreadsheet or other analysis program, each student must generate the calculations, results, and graphical output independently. ***Using a spreadsheet or graph generated by another student is a violation of the Academic Honesty Policy.***

COURSE EVALUATIONS: You will have an opportunity to evaluate all aspects of this course in a formal process to be completed online near the end of the term. You will receive an email reminder through your LU account.

CAMPUS CLOSURE: In the event of an announced campus closure in excess of four days due to a hurricane or other disaster, students are expected to login to Lamar University's website's homepage for instructions about continuing courses remotely. <http://lamar.edu>

EMERGENCY PROCEDURES: Many types of emergencies can occur on campus; instructions for severe weather or violence/active shooter, fire, or chemical release can be found at:

<http://www.lamar.edu/about-lu/administration/risk-management/index.html>.

Following are procedures for the first two:

Severe Weather

- Follow the directions of the instructor or emergency personnel.
- Seek shelter in an interior room or hallway on the lowest floor, putting as many walls as possible between you and the outside.
- If you are in a multi-story building, and you cannot get to the lowest floor, pick a hallway in the center of the building.
- Stay in the center of the room, away from exterior walls, windows, and doors.

Violence/Active Shooter (CADD)

- **CALL** - 8-3-1-1 from a campus phone (880-8311 from a cell phone). Note: Calling 9-1-1 from either a campus phone or cell phone will contact Beaumont City Police Dispatch rather than University Police.
- **AVOID** - If possible, self-evacuate to a safe area outside the building. Follow directions of police officers.
- **DENY** - Barricade the door with desks, chairs, bookcases or any other items. Move to a place inside the room where you are not visible. Turn off the lights and remain quiet. Remain there until told by police it is safe.

DEFEND - Use chairs, desks, cell phones or whatever is immediately available to distract and/or defend yourself and others from attack.

Lamar University expressly prohibits intimidation and harassment of students, faculty, staff, or applicants.

<http://students.lamar.edu/academic-support/code-of-conduct.html>

COURSE SCHEDULE: Tentative schedule indicates topics and exam dates, all of which are subject to change.

DATE	Topics Covered
01/17	Chapter 1: Uncertainties and distributions
01/19	Chapter 1: Central measures
01/22	Chapter 1: Exercises
01/24	Chapter 3: Error Propagation
01/26	Chapter 3: Error Propagation Applications
01/29	Chapter 2: Binomial Distribution
01/31	Chapter 2: Poisson Distribution
02/02	Chapter 2: Gaussian Distribution
02/05	Chapter 2: Gaussian Distribution
02/07	Chapter 2: Lorentzian Distribution
02/09	Chapter 4: Method of Maximum Likelihood
02/12	Chapter 4: Method of Maximum Likelihood
02/14	Chapter 4: Chisquare Test of a Distribution
02/16	QUIZ 1
02/19	Chapter 4: Chisquare Test of a Distribution
02/21	Chapter 6: Maximum Likelihood and Linear Functions
02/23	Chapter 6: Maximum Likelihood and Linear Functions
02/26	Chapter 6: Maximum Likelihood and Linear Functions
02/28	Chapter 6: Maximum Likelihood and Linear Functions
03/02	Chapter 6: Maximum Likelihood and Linear Functions
03/05	Chapter 6: Maximum Likelihood and Linear Functions
03/07	Chapter 7: Maximum Likelihood and Polynomial Functions
03/09	Chapter 7: Maximum Likelihood and Polynomial Functions
	03/12-16: Spring Break (No Classes)
03/19	Chapter 7: Maximum Likelihood and Polynomial Functions
03/21	Chapter 7: Maximum Likelihood and Polynomial Functions
03/23	Chapter 8: Fitting Non-linear Functions
03/26	Chapter 8: Fitting Non-linear Functions
03/28	QUIZ 2
	03/30: Good Friday (No Classes)
04/02	Chapter 8: Fitting Non-linear Functions
04/04	Chapter 8: Fitting Non-linear Functions
04/06	Chapter 8: Fitting Non-linear Functions
04/09	Chapter 8: Fitting Non-linear Functions
04/11	Chapter 8: Fitting Non-linear Functions
04/13	Chapter 9: Composite Curves and Area Under the Curve
04/16	Chapter 9: Composite Curves and Area Under the Curve
04/18	Chapter 9: Composite Curves and Area Under the Curve
04/20	Chapter 9: Composite Curves and Area Under the Curve
04/23	Chapter 11: Confidence Intervals
04/25	Chapter 11: Confidence Intervals
04/27	Chapter 11: Confidence Intervals
04/30	QUIZ 3