

PHYS 341

Fall 2020

Office: Luter 304, but mostly online!

Office Hours: Mon/Wed/Fri 11:00am-12:00pm, or by appointment – again, all online!

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594-7451

DESIGN AND ANALYSIS OF EXPERIMENTS

Texts: There is not a “required” text for this course. However, you may find the following textbook useful:

An Introduction to Statistics with Python, With Applications in the Life Sciences

Thomas Haslwanter

Published on Google Books (available in the Google Play store)

We will use WebAssign for the homework problem sets, and they will be taken from the following book, which is also a great reference:

Probability and Statistics for Engineering and the Sciences

Jay L. Devore

Published by Brooks/Cole

You WILL need to purchase the WebAssign subscription for this textbook (see below)

Also, see attached Reference List for additional recommended textbooks ...

Goals: To be introduced to the field of experimental design, with particular reference to the use of advanced statistical techniques for experimental analysis.

To gain an understanding of the important role that experimental design plays in the optimization of processes.

To acquire and enhance analysis skills, and to gain an appreciation for the importance of critical judgment in the design and analysis of experiments.

Topics: Propagation of experimental uncertainties, distributions about the mean, estimating means and errors, statistical inference, analysis of variance, single factor experiments, block designs and Latin squares, factorial experiments, nested experiments.

Homework: Assignments will be given periodically, usually once every ten days to two weeks, and in most cases will be due approximately one week later. This year, we will be using WebAssign (www.webassign.net) for the homework sets.

You can sign up for the course by going to the above URL. To do so, you will need the class key:

For the MWF 9:00am-9:50am section, the class key is **cnu 6444 9259**

Exams: Two midterm tests and a comprehensive final.

Grading:	Homework	30%
	Midterm Test 1	15%
	Midterm Test 2	15%
	Final exam	40%

Homework is due by 11:59 pm on the due date. No extensions will be given, except in the case of a valid DOCUMENTED reason.

If you miss a midterm exam because of a valid, DOCUMENTED reason, the grade portion for that exam will be added to your final exam weighting. No make-up exams will be given under any circumstances.

The evaluation of your performance in this course will be based entirely on the regular homework assignments and scheduled exams. There is no possibility to do extra work for extra credit.

Final grades will be assigned as follows:

A = 87-100%; A⁻ = 80-86 %
B⁺ = 77-79 %; B = 73 –77 %; B⁻ = 70 – 73 %
C⁺ = 67-69%; C = 63 –67 %; C⁻ = 60 – 63 %
D⁺ = 57-59%; D = 53 –57 %; D⁻ = 50 – 53 %: F < 50%

Additional Information, provided by the CNU Administration, which you may find useful (and with which I happen to agree):

University Statement on Diversity and Inclusion:

The Christopher Newport University community engages and respects different viewpoints, understands the cultural and structural context in which those viewpoints emerge, and questions the development of our own perspectives and values, as these are among the fundamental tenets of a liberal arts education.

Accordingly, we affirm our commitment to a campus culture that embraces the full spectrum of human attributes, perspectives, and disciplines, and offers every member of the University the opportunity to become their best self.

Understanding and respecting differences can best develop in a community where members learn, live, work, and serve among individuals with diverse worldviews, identities, and values. We are dedicated to upholding the dignity and worth of all members of this academic community such that all may engage effectively and compassionately in a pluralistic society.

If you have specific questions, suggestions or concerns regarding diversity on campus please contact Diversity.Inclusion@CNU.edu

Disabilities:

In order for a student to receive an accommodation for a disability, that disability must be on record in the Office of Student Affairs, 3rd Floor, David Student Union (DSU). If you believe that you have a disability, please contact Jacquelyn Barnes, Student Disability Support Specialist in Student Affairs (594-7160) to discuss your needs.

Students with documented disabilities are to notify the instructor at least seven days prior to the point at which they require an accommodation (the first day of class is recommended), in private, if accommodation is needed. The instructor will provide students with disabilities with the reasonable accommodations approved and directed by the Office of Student Affairs. Work completed before the student notifies the instructor of his/her disability may be counted toward the final grade at the sole discretion of the instructor.

Success:

I want you to succeed in this course and at Christopher Newport. I encourage you to contact me during office hours or to schedule an appointment to discuss course content or to answer questions you have. During the Coronavirus pandemic, our conversations may need to be via electronic means. If I become concerned about your course performance, attendance, engagement, or well-being, I will contact you first. I also may submit a referral through our Captains Care Program. The referral will be received by the Center for Academic Success as well as other departments when appropriate (Counseling Services, Office of Student Engagement). If you are an athlete, the Athletic Academic Support Coordinator will be notified. Someone will contact you to help determine what will help you succeed. Please remember that this is a means for me to support you and help foster your success at Christopher Newport.

Academic Support:

The Center for Academic Success offers free tutoring assistance for Christopher Newport students in several academic areas. Center staff offer individual assistance and/or workshops on various study strategies to help you perform your best in your courses. The center also houses the Alice F. Randall Writing Center. Writing consultants can help you at any stage of the writing process, from invention, to development of ideas, to polishing a final draft. The Center is not a proofreading service, but consultants can help you to recognize and find grammar and punctuation errors in your work as well as provide assistance with global tasks. Contact them as early in the writing process as you can!

You may contact the Center for Academic Success to request a tutor, confer with a writing consultant, obtain a schedule of workshops, or make an appointment to talk with a staff member about study skills and strategies. The Center is located in Christopher Newport Hall, first floor, room 123. You may email academicsuccess@cnu.edu or call (757) 594-7684.

Safety Protocols Specific to COVID-19 and Academic Instruction:

Offering in-person instruction on campus requires everyone to take individual responsibility for reducing the risk of exposure for all campus community members both inside and outside the classroom. Irresponsible behavior jeopardizes not only your own health, but also that of your fellow students, friends, professors and advisors, and members of our staff. Therefore, you are expected to learn and diligently follow the safety protocols required by the University at all times. The following protocols apply specifically to instructional spaces and academic buildings.

Prior to leaving their residence hall room or home, students should:

- conduct daily health screenings; and
- pack cloth face covering(s), personal cleaning supplies, and related items for campus use.

Students cannot enter instructional spaces or academic buildings if they:

- are experiencing symptoms of any illness, regardless of whether they believe the illness to be COVID-19;
- have been exposed to someone with COVID-19;
- are in isolation while waiting for COVID-19 test results;

- have been directed to quarantine by a University or health department official; or
- have been diagnosed with COVID-19 and have not been approved to return to campus by a healthcare provider.

All students must adhere to the following requirements while inside instructional spaces, common areas and offices:

- attend only the classes and sections in which they are officially enrolled;
- sit in their assigned seats or work at their assigned stations every class period;
- wear a face covering at all times* (face coverings should cover the nose and mouth, be secured under the chin, and fit snugly against the sides of the face);
- use additional personal protective equipment as required for specific classes;
- maintain physical distancing of at least six feet from other people;
- disinfect their own work areas upon arrival in and prior to departure from the instructional space;
- refrain from sharing personal materials, such as pens, textbooks, etc., with others;
- refrain from bringing food and drinks into the instructional space;
- follow all directional signs; and
- follow directives regarding office hours and advising appointments.

**Students who have received an exemption from the face covering requirement for health reasons must present the proof of the exemption provided by the Office of Student Affairs to the instructor upon entering the instructional space.*

Because non-compliance potentially endangers others, faculty members:

- are authorized to instruct anyone in non-compliance with safety protocols to correct the non-compliance or immediately leave the instructional space; and
- may submit referrals to CHECS to report non-compliance with safety protocols.

Faculty should immediately notify the Vice President for Student Affairs, Kevin Hughes (dosa@cnu.edu or kmhughes@cnu.edu), if they become aware of a student who has sought a diagnostic test or who has been exposed. In addition, faculty members may submit referrals through the Captain's Care Program to report absences as a way of identifying students who may have become ill. It would be appropriate to do so when students have not attended class or communicated with the faculty member in any way for a period of one week or longer.

Course Materials:

All content created and assembled by the faculty member and used in this course is to be considered intellectual property owned by the faculty member and Christopher Newport University. It is provided solely for the private use of the students currently enrolled in this course. To ensure the free and open discussion of ideas, students may not make available any of the original course content, including but not limited to lectures, discussions, videos, handouts, and/or activities, to anyone not currently enrolled in the course without the advance written permission of the instructor. This means that students may not record, download, screenshot, or in any way copy original course material for the purpose of distribution beyond this course. A violation may be considered theft. It is the student's responsibility to protect course material when accessing it outside of the physical classroom space.

Code of Conduct

We can feel anonymous in online formats, but you are expected to handle yourself professionally during online courses, just as you would with an in-person class. You are expected to arrive on time and not leave early. You also are expected to abide by CNU's community guidelines and honor code.

Guidelines for attending online courses:

- Do your best to be in a low-distraction area.
- Please keep your camera on throughout the class.
- Make sure there is a light source close to your camera. Otherwise, your face might be blurry.
- Mute your microphone until you have an idea to share.
- If you would like to speak, you are welcome to indicate so by clicking on the raised hand icon at the bottom of your screen or by turning on your microphone and asking to make a comment.
- Refrain from posting comments on the chat forum that are not directly related to the topic being discussed

Conduct during online courses (adapted
from https://wiki.creativecommons.org/wiki/Slack/Code_of_Conduct)

The following behaviors are expected and requested of all community members:

- Be friendly, patient, and welcoming. We strive to be a community that welcomes and supports people of all backgrounds and identities. This includes, but is not limited to members of any race, ethnicity, culture, national origin, color, immigration status, social and economic class, educational level, sex, sexual orientation, gender identity and expression, age, size, family status, political belief, religion, and mental and physical ability.
- Be considerate and respectful of others' ideas. We will not all agree all the time, but disagreement is no excuse for poor behavior and poor manners. Your point of view is valid, but it is not the only one.
- Be careful in the words that you choose. We are a community of professionals, and we conduct ourselves professionally. Do not insult or put down other participants.
- Harassment and other exclusionary behaviors are unacceptable. This includes, but is not limited to:
 - Violent threats or language directed against another person or group.
 - Discriminatory jokes and language.
 - Posting sexually explicit or violent material.
 - Posting (or threatening to post) other people's personally identifying information ("doxing").
 - Personal insults of any kind, but especially those using racist or sexist terms.
 - Unwelcome sexual attention.
 - Advocating for, or encouraging, any of the above behavior.
 - In general, if someone asks you to stop, then stop.
- Remember that we are different. The strength of CNU comes from its varied community, people from a range of backgrounds. Different people have different perspectives on problems, learn in different ways, and may be able to explain in different ways that will be helpful to you or someone else. Being unable to understand

why someone holds a viewpoint does not mean that they are wrong. Do not forget that it is human to err and blaming each other does not get us anywhere. Instead, focus on helping to resolve issues and learning from mistakes.

- Any abuse of the forum privilege will warrant a CHECS report, and banning from the forums.

Textbook and Reference List

Data Analysis and Error Propagation

Bevington, Phillip, and D. Keith Robinson. Data Reduction and Error Analysis for the Physical Sciences.: The McGraw-Hill Companies, 2002. ISBN: 9780072472271

Taylor, John R. Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements.: University Science Press, 1997. ISBN: 9780935702750

Design of Experiments

Montgomery, Douglas C. Design and Analysis of Experiments, 6th Edition.: John Wiley & Sons, Incorporated, 2004. ISBN: 9780471487357

Baird, D.C. Experimentation: An Introduction to Measurement Theory and Experiment Design, 3rd Edition.: Prentice Hall, 1995. ISBN: 0133032981

Canavos, George C., and Koutrouvelis, Ioannis A. An Introduction to the Design and Analysis of Experiments.: Prentice Hall, 2008. ISBN: 9780136158639

Cobb, George W. Introduction to Design and Analysis of Experiments.: Key College Publishing, 2002. ISBN: 9781931914079

Probability and Statistics

Devore, Jay L. Probability and Statistics for Engineering and the Sciences.: Duxbury Resource Center, 2008. ISBN: 9780495557449