

# Course Outline & Introduction

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Design for Data Science (ADSC2030)

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Winter 2025



**THOMPSON RIVERS UNIVERSITY**

# Topics

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## Course Basics

- Course: Design for Data Science (ADSC2030)
- Lecturer: Ing. Sean Hellingman, Ph.D.
- Meeting times: Tues/Fri 10:00 - 11:15 in OM 1241

## Course Outcomes

- **Select and create the appropriate experimental designs tailored for particular analyses.**
- Analyze data from various designs.
- Recognize designs that are not necessarily regression and realize how regression approaches apply to them.

# Tentative Topics

- Design definitions
- Completely randomized designs
  - One factor
  - Factorial designs
- Randomized block designs
  - Randomized complete block designs
  - Latin square designs
- Designs to study variance
  - One-factor sampling experiments
  - Multiple-factor sampling experiments
  - Nested and Staggered sampling experiments
  - Designs with fixed and random factors
- Incomplete and confounded block designs

# Software

- R within the R Studio environment.

# Moodle

- All important course information will be located on the course Moodle page.

## Lectures

- Content is focused on the applied side of theory.
- Combination of lecturing and working through examples.
- Please ask questions as they arise!
- Practice *exercises* are included at the end of the lecture slides for your convenience.
- **Expectations:**
  - Please be respectful to everyone.
  - **Please don't be disruptive to your colleagues.**
  - **Please leave your mobile devices on silent.**



## Lecture Participation

- We are in a computer lab & R is loaded on the computers.
- I will post example code **prior** to lectures.
- It is strongly encouraged to work along through the examples.

## Course Evaluation Weights

- Assignments 40%
- Tests 30%
- Project 30%

# TRU ADSC Letter Grades

Letter Grade	Numerical Grade	Grade Points	Letter Grade Definitions
<b>A+</b>	90–100	4.33	Excellent. Superior performance showing comprehensive, in-depth understanding of subject matter. Demonstrates initiative and fluency of expression.
<b>A</b>	85–89	4.00	
<b>A-</b>	80–84	3.67	
<b>B+</b>	77–79	3.33	Very good. Clearly above average performance with knowledge of principles and facts generally complete and with no serious deficiencies.
<b>B</b>	73–76	3.00	
<b>B-</b>	70–72	2.67	
<b>C+</b>	65–69	2.33	Satisfactory. Basic understanding with knowledge of principles and facts at least adequate to communicate intelligently in the discipline.
<b>C</b>	60–64	2.00	
<b>C-</b>	55–59	1.67	Pass. Some understanding of principles and facts but with definite deficiencies.
<b>D</b>	50–54	1.00	Minimal pass. A passing grade indicating marginal performance. Student not likely to succeed in subsequent courses in the subject.
<b>F</b>	0–49	0.00	Unsatisfactory. Fail. Knowledge of principles and facts is fragmentary.

## Assignments (30%)

- 5 total assignments:
  - Focus on practical applications based on the lectures.
  - Assignments will be uploaded as R markdown files in moodle.
  - Due dates can be found in the tentative calendar & on moodle.
  - The **lowest** grade will be dropped.
  - Collaboration is **encouraged** but please submit separate and *different* documents.
  - **Note:** Due dates aren't always consistent.
- **Expectations:**
  - Assignments are mandatory in this course.
  - Completed assignments will be uploaded as to moodle.
  - Please include your name and TRU ID on your assignment.
  - **Late assignments will not be graded.**
  - *LLMs can help when you are stuck, they are not to be used to complete assignments.*

## Tests (30%)

- 2 total tests:
  - Test I is tentatively scheduled for **March 7 during the lecture period.**
  - Test II will take place during the exam period.
  - More details about the tests will be uploaded closer to the test dates.
- **Expectations:**
  - Please leave personal items, including mobile phones, in your bag at the front of the class.
  - Please bring and be ready to present English/French language identification (TRU student card) to the tests.
  - **The TRU Academic Integrity policy is always active.**

## Project (30%)

- 1 term project:
  - Designed to apply methods to real-life scenarios.
  - Groups of 1-3 students may work on the same project.
  - Tentatively due the last week of classes.
  - *More detailed expectations will be posed soon.*

## Office Hours

- Room: OM2812
- Times: Monday 11:30 - 12:20 & Wednesday 13:30 - 14:20
  - *Or by appointment*

## Email

- Email questions to: [shellingman@tru.ca](mailto:shellingman@tru.ca)
- I will be happy to help when I can!
- **Email Expectations:**
  - Please, include an informative subject.
  - Please, clearly state your exact problem and what you have already tried.
  - Please do not email questions last minute (you may not get help in time).



## Suggested Textbooks

- The lectures, exercises, and assignments should be sufficient.
- I will also post links to open source resources throughout the course.
- If you want more information on these topics:
  - Lawson, J. (2014). *Design and Analysis of Experiments with R (Vol. 115)*. CRC press.
  - Wu, C. J., & Hamada, M. S. (2021). *Experiments: planning, analysis, and optimization (Third Edition)*. John Wiley & Sons.

## Career Connections

- Career Connections office: OM 1712
- Set up a student account.
  - Book appointments with our Career/Co-op Coordinators.
  - View Job Postings and hear about TRU Events.
  - **Apply to the BBA/Post Bacc Co-op Program.**
- Contacts:
  - Harshita Dhima (hdhiman@tru.ca): Business Co-op Coordinator
  - (it\_cooped@tru.ca): Comp Sci/IT Engineering & Math Co-op
- **Apply sooner than later!**

## Student Resources at TRU

- Academic Supports:  
<https://www.tru.ca/current/academic-supports.html>
- Health and Wellness: <https://www.tru.ca/current/wellness.html>
- Diversity & Equity: <https://www.tru.ca/current/diversity-equity.html>
- Career & Experiential Learning:  
<https://www.tru.ca/current/jobs-careers.html>
- Security: <https://www.tru.ca/risk-management-services/security.html>
- Students' Union: <https://trusu.ca/>

## TRU SAFE App

- App: <https://www.tru.ca/risk-management-services/security/tru-safe-app.html>
- Apple: <https://itunes.apple.com/app/id1151547903>
- Android:  
<https://play.google.com/store/apps/details?id=com.cutcom.apparmor.tru>

## Accessibility

- All TRU students who require accommodations are encouraged to register with Accessibility Services upon registering with TRU.
- Help determine how test and exam accommodations can be arranged.

## LLM AI (ChatGPT)

*The instructor reserves the right to question the student on any solutions that appear to be directly produced by generative AI.*

## Course Outline

- Please refer to the official Course Outline document for additional information about the course.

## Exercise 1

- Take some time to review the *Introduction to Design* slides from ADSC1000.