

**Hong Kong University of Science and Technology**  
**School of Business and Management**  
**Fall 2022**

**ISOM 3390 — Business Programming in R**

Monday and Wednesday 12:00 – 13:20

Room 1005, LSK Business Building

**Instructor:** Hyungsoo Lim, Ph.D.  
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**Office:** LSK Room 6061  
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**Course website:** <http://canvas.ust.hk>

**Teaching assistant:** Shivendra Singh  
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**TA's Office:** LSK Room 4049A  
**TA's Office hours:** By appointment only

**Course description**

This course introduces students to R Programming language and its important tools for programming, data visualization, and business analytics. Students will learn common data structures, variables, and data types used in R and write R scripts and build R markdown documents to share their code others. Furthermore, this course will provide skills for emerging business applications such as web scraping and text analytics. Students will be able to effectively interface with practitioners and researchers by utilizing various packages available in R.

**Learning outcomes**

Upon successfully completing this course, you will be able to:

- Develop proficiency in R programming
- Understand data structures and manipulation
- Import various data formats into R using RStudio
- Provide data summary by utilizing descriptive statistics and statistical plots
- Construct effective techniques for data visualization and communication
- Analyze text-based data
- Use R Markdown to write reports

**Prerequisites**

This course has prerequisites: ISOM3230 (Business Applications Programming) and ISOM3360 (Data Mining for Business Analytics).

## Course materials

All the materials (e.g., lecture slides, readings) that you need will be provided through Canvas (<http://canvas.ust.hk>).

Recommended, but NOT required, textbooks:

- [\*R for Data Science\*](#) by Hadley Wickham and Garrett Grolemund
- [\*Hands-On Programming with R\*](#) by Garrett Grolemund
- [\*Data Visualization\*](#) by Kieran Healy
- [\*Fundamentals of Data Visualization\*](#) by Claus O. Wilke
- De Vries, Andrie, and Joris Meys. *R for Dummies*. John Wiley & Sons, 2015.

## Evaluations

Class Participation	10%
Homework	20%
Group project	20%
Mid-term exam	25%
Final-term exam	25%
Total	100%

### ***Class Participation (10%)***

- In-Class Participation (10%): There are two aspects of your class participation. First, students are expected to be prepared and participate in class activities (e.g., reading assignments, discussions) (5%). All students are expected to contribute at least occasionally. Second, students are also expected to attend the lab sessions (5%). Although lab sessions are lecture-based sessions, follow-up lab sessions allow you to get a hands-on experience, which is essential for you to learn programming.
- To facilitate an interactive class, I may cold call students if no student voluntarily speaks up.
- Absences **ONLY** can be excused with a doctor's note for an illness or a note from a university authority documenting participation in a university-sponsored activity.

### ***Homework (20%)***

There will be hands-on homework assignments (using Canvas website). Assignments will be graded and returned promptly. **The due date of each homework assignment** will be announced upon its release on Canvas.

### ***Group project (20%)***

You will be assigned to small groups (3 at maximum) to work on a final group project. You will select project topics provided by the instructor. Each group will cooperate on writing code, documenting it, writing a report, and presenting the project at the end of semester. One component (10% out of 30%) of your final project grade will be based on your teammates' assessment of your contribution to the project. Typically, all members of a group would receive the same grade for the group project. However, I will moderate individual students' group project grades based on

peer evaluations. Students who perform exceedingly well in their peer evaluations could receive higher group project grades than their group mates. Conversely, students who do badly in their peer evaluations would receive lower group project grades.

### ***Mid-term (25%) and Final (25%)***

- The exams will be based on the topics and related concepts taught during class.
- The midterm exam will test issues covered in the first half of the course. The final exam will cover the classes in the second half of the course.
- Review sessions will be scheduled to help you prepare for these examinations.
- All examinations will be closed book, closed notes, and no devices.
- **Do not miss the exam: there will be NO make-up for both mid-term and final examinations.**
- If you have to miss the mid-term exam due to extraordinary circumstances such as unexpected hospitalization or loss of a family member, please let me (cc TA) know as soon as you can and see me with a doctor's note and/or verifiable and valid evidence. Only under such extraordinary circumstances, a make-up exam will be arranged for you but with *additional essay questions or/and oral examination*. There is **NO make-up** for the **final examination**.
  - In other cases, there will be no make-up exam if you miss the exam, and you will automatically receive **0** points for that exam.
- Time conflicts with job interviews, other tests, travel plans, social obligations or any other, domestic, social, financial, religious or geopolitical situation, etc. will **NOT** be considered. There will be **NO** exceptions to this rule.

### **Class Policies**

- Be professional: do not do things that you should not do in a professional setting (e.g., do not eat, use mobile phone).
- Be on time: better still, be ahead of time by at least 1 minute.
- Any type of cross section activities is not allowed (e.g., attendance, group project, and exams).

### **Late Policy**

A 20% penalty will be deducted for each day or part of a day that an assignment is late. For instance, if you are 1-day late in submission, you or your group will be graded on 80% of your points for the submission. If you 2-days late in submission you or your group will be graded on 60% (reduction of  $2 \times 20\%$ ) of your points for the submission. If you are late by 5 days, then you are better off NOT submitting the deliverable. Please prepare in advance so that you will not encounter technical difficulties that will result in your work receiving a late penalty. If you have a conflict with the due date, assignments can always be submitted early.

### **Academic Integrity**

Academic integrity entails absolute honesty in one's intellectual efforts. HKUST places a strong emphasis on academic integrity and has introduced new regulations to back this up. You should be especially aware of the policies on cheating and plagiarism. Cheating is any action that violates

University norms or an instructor’s guidelines for the preparation and submission of assignments. Such actions may include using or providing unauthorized assistance or materials on course assignments or possessing unauthorized materials during an examination. Plagiarism involves the representation of another’s work as your own, for example: (a) submitting as one’s own any material that is copied from published or unpublished sources such as the Internet, print, computer files, audio disks, video programs or musical scores without proper acknowledgement that it is someone else’s; (b) paraphrasing another’s views, opinions or insights without proper acknowledgement or copying of any source in whole or in part with only minor changes in wording or syntax even with acknowledgement; (c) submitting as one’s own work a report, examination, paper, computer file, lab report or other assignment which has been prepared by someone else. If you are unsure about what constitutes unauthorized help on an exam or assignment, or what information requires citation and/or attribution, please ask your instructor. **Violations may result in the failure of the assignment, failure of the course, and/or additional disciplinary actions.** For more information, please visit the website at <https://registry.hkust.edu.hk/resource-library/academic-integrity>.

**Course Schedule**

Week	Date	Topic
1	Sep. 5	Introduction to R programming
	Sep. 7	Data structures, variables, and data types (1)
2	Sep. 12	No class (Day after Mid-Autumn Festival)
	Sep. 14	Data structures, variables, and data types (2)
3	Sep. 19	R packages and scripts (1)
	Sep. 21	R packages and scripts (2)
4	Sep. 26	Descriptive statistics in R (1)
	Sep. 28	Descriptive statistics in R (2)
5	Oct. 3	Statistical graphs (1)
	Oct. 5	Statistical graphs (2)
6	Oct. 10	Working with messy data (1)
	Oct. 12	Working with messy data (2)
7	Oct. 17	Iteration
	Oct. 19	Mid-term exam review
8	Oct. 24	No class (Mid-term break)
	Oct. 26	Conditional statements
9	Oct. 31	Data exploration and visualization (1)
	Nov. 2	Data exploration and visualization (2)
10	Nov. 7	Writing functions reporting (1)
	Nov. 9	Writing functions reporting (2)
11	Nov. 14	Web scraping (1)
	Nov. 16	Web scraping (2)
12	Nov. 21	Text analytics (1)
	Nov. 23	Text analytics (2)
13	Nov. 28	Project presentation
	Nov. 30	Course recap and final exam review

## Lab Schedule

Week	Date	Topic
1	Sep. 8	R and RStudio installation and R markdown syntax
2	Sep. 15	Exploring data frames
3	Sep. 22	Utilizing R packages
4	Sep. 29	Exploring descriptive statistics
5	Oct. 6	Generating statistical plots
6	Oct. 13	Handling complex dataset
7	Oct. 20	Practicing several loops
8	Oct. 27	No lab (Mid-term exam)
9	Nov. 3	Plotting with ggplot2
10	Nov. 10	Writing own functions
11	Nov. 17	Web scraping
12	Nov. 24	Text analytics