

Programming for Applications

Syllabus

Yu-You Liou

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Lecturer: Yu-You Liou	Contact: d10627008@ntu.edu.tw
Course Code: EIB-302-01-A1	Website: https://yyliou.github.io/pa
Meeting Time: Tuesday, Periods 8–9 (15:10–17:00)	Location: A207

Course Objectives

1. To enable students to install, configure, and operate the R environment confidently and to understand the structure of the R language.
2. To develop students' ability to write clear, correct, and efficient R programs using functions, objects, and environments.
3. To equip students with practical skills for importing, cleaning, transforming, visualizing, and statistically analyzing real-world data.
4. To integrate generative AI to enhance students' workflows in programming and compilation tasks.

Textbooks

1. Adler, J. *R in a Nutshell: A Desktop Quick Reference* (2nd ed.). O'Reilly Media. (Main)
2. Wickham, H., Navarro, D., & Pedersen, T. L. *ggplot2: Elegant Graphics for Data Analysis* (3rd ed.). <https://ggplot2-book.org>

Course Structure

1. **Lecture** (First hour): Foundational knowledge and concepts introduced each session.
2. **Lab** (Second hour): Hands-on in-class exercises using R to apply the concepts learned during the lecture.

Assessment Criteria

1. **In-Class Exercises** (36%): 12 exercises $\times$ 3% each, begun in class and due before midnight of the following week (see Regulations).
2. **Mid-Term Exam** (32%) and **Final Exam** (32%).

Regulations

1. **Attendance**

Per Shih Chien University regulations, students who are absent for more than one-third of class sessions will receive a final grade of zero. Make-up attendance will not be permitted.

2. **In-class exercise deadline**

The deadline for all in-class exercises is before midnight of the following week. Late submissions will not be accepted.

3. Academic Integrity

All submitted work must be the student's own. Copying from other students is strictly prohibited. AI detection tools are used to review submissions; any work found to be copied will receive a grade of zero.

4. AI Policy

Students may use AI tools (e.g., ChatGPT or Gemini) as learning aids for in-class exercises, but must be able to explain and defend any code or analysis they submit. Uncritical submission of AI-generated work without understanding constitutes academic dishonesty. AI tools are not permitted during examinations.

Exam Regulations

The examination is conducted online under the following regulations.

1. Mandatory Attendance

Students must take the exam in person. Roll call will be taken five minutes before the exam begins. Late arrival or absence will result in a score of zero.

2. Network Restriction

The exam system tracks IP addresses. You must use the campus Wi-Fi. Access from a non-campus IP address will result in a score of zero.

3. One Device Only

The exam must be taken on a single device. Keeping any additional device, such as a phone or a tablet, available during the exam will result in a score of zero.

4. Authorized Resources

This is an open-book exam. Printed reference materials are permitted without limit. Electronic reference materials and AI tools, such as ChatGPT or Gemini, are prohibited. Any use will result in a score of zero.

5. Media Prohibition

Photography, video or audio recording, and screenshotting are strictly prohibited. Violators will receive a score of zero.

6. No Communication or Disturbance

Interpersonal communication, causing noise or disruptive movements are strictly prohibited. Violators will receive a score of zero.

7. Copy-Paste Disabled

The exam system prohibits copying and pasting. Do not attempt to bypass this feature.

Required Software

All software is free and open-source: **R** at <https://cran.r-project.org>, **RStudio Desktop** at <https://posit.co/download/rstudio-desktop>, and R packages **tidyverse**, **ggplot2**, **lattice** (installation instructions on the course R page).

Course Schedule

1. Week 1: Part I — R basics: installing R, the user interface, a first tutorial, and packages (Ch. 1–4).
2. Weeks 2–4: Part II — The R language: overview, syntax, objects, symbols and environments, functions, and object-oriented programming (Ch. 5–10).
3. Weeks 5–6: Part III — Working with data: saving, loading, editing, and preparing data (Ch. 11–12).

4. Week 7: Part IV — Data visualization with base graphics (Ch. 13).
5. Weeks 8–9: Mid-term exam.
6. Week 10: Part IV — Lattice graphics and `ggplot2` (Ch. 14–15).
7. Weeks 11–14: Part V — Statistics with R: analyzing data, probability distributions, statistical tests, power tests, regression, classification, machine learning, and time series (Ch. 16–23).
8. Weeks 15–16: Final exam.
9. Weeks 17–18: Flexible learning weeks; Part VI (Ch. 24–26) provided as self-study material.

Syllabus is subject to change. Any updates will be announced on the course website.