



HOA 732

Advanced Statistics in R for Hospitality and Business

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Course Information

Subject code	HOA 732
Subject title	Advanced Statistics in R for Hospitality and Business
Semester	Fall 2026
Instructional format	Eight-week modular, web-based lecture and computer-based activities
Days and times	Online asynchronous
Location	Web-based
Course dates	October 19–December 12, 2026
Course credits	3 credits
Instructor of record	Mana Azizsoltani, PhD
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Office hours	By scheduled appointment or Zoom/Webex

Course Description

HOA 732 builds on HOA 730 by introducing advanced statistical learning and machine learning methods for hospitality and business problems. Statistical learning focuses on inference and relationships among variables. Machine learning places greater emphasis on prediction and out-of-sample accuracy. Students will learn when each perspective is useful and how to evaluate the evidence produced by a model.

The course uses R and RStudio to implement classification, regression, ensemble, dimension-reduction, and unsupervised learning methods. Topics include logistic regression, decision trees, random forests, support vector machines, boosting, neural networks, principal components analysis, clustering, and linear discriminant analysis. Time series methods may be included as time permits. Students will work with applied data, assess model performance, and communicate findings to research and professional audiences.

Prerequisite

HOA 730 or equivalent.

Course Objectives and Learning Outcomes

Upon successful completion of the course, students will be able to:

1. Distinguish between statistical learning for inference and machine learning for prediction, and translate hospitality and business questions into appropriate analytical problems.
2. Prepare data for modeling and create reproducible analysis workflows in R and RStudio.
3. Fit and interpret logistic regression and other generalized linear models.
4. Build and compare decision trees, random forests, support vector machines, boosting models, and neural networks.

5. Apply dimension-reduction, classification, and clustering methods, including principal components analysis and linear discriminant analysis.
6. Evaluate model performance, explain limitations and uncertainty, and communicate results clearly to technical and nontechnical audiences.

Course Content

Major areas of study include:

- review of data visualization, statistical inference, multiple regression, and multicollinearity
- predictive modeling workflows, data splitting, resampling, and performance metrics
- binary logistic regression and classification
- decision trees for classification and regression
- random forests and boosting methods
- support vector machines
- neural networks
- principal components analysis and dimension reduction
- clustering and linear discriminant analysis
- time series modeling when time permits

Learning Resources and Technology

Recommended Resources

- Singh, A. (2026). *Applied Statistics for All Disciplines with R and RStudio* (1st ed.).
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). *An Introduction to Statistical Learning: With Applications in R* (2nd ed.). Springer. The R edition is available at <https://www.statlearning.com>.
- Paradis, E. (2005). *R for Beginners*. Available at https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf.
- R Core Team. *An Introduction to R*. Available at <https://cran.r-project.org/doc/manuals/R-intro.pdf>.
- Course readings, hospitality research articles, datasets, examples, and instructional materials posted in WebCampus (Canvas).

R and RStudio

R is a free environment for statistical computing and graphics, and RStudio is an interface for working with R. Students must have reliable access to a computer capable of running both applications. Installation guidance is available at <https://rstudio-education.github.io/hopr/starting.html>. Students should install the software early and bring a suitable computer to class when requested.

This course emphasizes interpretation and reproducible analysis. A calculator is not a substitute for completing required work in R.

Teaching and Learning Approach

I want students to learn how to *think with data*. I bring experience in statistics, analytics, applied data science, and hospitality to the classroom, and I genuinely enjoy teaching this material. Class should have energy. We will work through real hospitality problems, test ideas, and learn from results that do not go as planned. The point is to understand why a method makes sense and what the evidence allows us to conclude.

I also want students to take the wheel. Good learning requires preparation, curiosity, practice, and a willingness to ask for help. Modern data work depends on useful resources, so we will learn to use R, documentation, online materials, coding assistants, and generative AI responsibly. These tools can help students learn and solve problems, but they cannot do the thinking for them. Students must understand their work, check it carefully, follow the rules of each assignment, and be able to explain the choices they made.

Assessment

Assessment category	Weight
Professionalism and participation	10%
Homework and in-class assignments	20%
Midterm project	30%
Final project	40%
Total	100%

Professionalism and Participation (10%)

Professionalism matters because the habits students develop in class shape their personal growth, their reputation, and the way others experience working with them. It also reflects what employers and colleagues expect in the real world. Students should arrive prepared and on time, communicate respectfully, follow through on responsibilities, contribute to class activities, and take ownership of their work. Attendance alone does not earn full credit, but consistent and thoughtful participation is difficult without it.

Homework and In-Class Assignments (20%)

Assignments provide practice preparing data, fitting and comparing models, evaluating predictive performance, interpreting results, and communicating statistical evidence. Submit assignments through WebCampus (Canvas). Assignment instructions, due dates, grades, and feedback will also be posted there.

Midterm Project (30%)

The midterm project assesses the ability to frame a classification problem, prepare the data, compare models, evaluate out-of-sample performance, and explain the results in R.

Final Project (40%)

The final project requires an applied analysis using advanced statistical or machine learning methods covered in the course. Students must justify the modeling approach, evaluate performance honestly, interpret the result, and communicate what the analysis means for the problem.

Specific requirements, datasets, rubrics, and deadlines will be provided in WebCampus (Canvas).

Standard for Statistical Work

Strong work does more than reproduce software output. It demonstrates understanding of the problem, translates the problem into statistical terms, selects and executes an appropriate method, examines relevant assumptions, and interprets the result accurately in context. Work that contains unexplained output, omits essential diagnostics, or makes unsupported claims will not earn full credit.

Grades

A	93–100%	A–	90–92.9%	B+	87–89.9%
B	83–86.9%	B–	80–82.9%	C+	77–79.9%
C	73–76.9%	C–	70–72.9%	D+	67–69.9%
D	63–66.9%	D–	60–62.9%	F	Below 60%

Grades are determined by the weighted categories above. Scores are not rounded unless announced otherwise. Students are responsible for monitoring their grades and promptly reporting possible recording errors.

Late Work

I will accept late work, but a 10 percentage point penalty will be applied for every calendar day that the work is submitted past the due date. For example, an assignment submitted one day late can earn no more than 90%, and an assignment submitted two days late can earn no more than 80%. The submission time recorded in WebCampus (Canvas) will be used to determine the penalty.

Tentative Weekly Schedule

The schedule is a planning guide and may change based on the pace of the class. Changes will be announced in class and through WebCampus (Canvas). Assignment instructions and deadlines posted in WebCampus (Canvas) are authoritative.

Week	Dates	Teaching focus	Coursework and milestones
1	Oct. 19–25	Course introduction; R and RStudio setup; review of visualization, summary statistics, statistical inference, multiple regression, and multicollinearity	Review work and R practice
2	Oct. 26–Nov. 1	Classification problems; binary logistic regression; decision tree classifiers; confusion matrices and classification metrics	Decision tree classification assignment
3	Nov. 2–8	Random forest classifiers; support vector machine classifiers; resampling and out-of-sample evaluation	Midterm project
4	Nov. 9–15	Regression problems; regression trees; random forest regression; comparing predictive performance	Random forest assignment
5	Nov. 16–22	Support vector regression; neural networks; tuning and evaluating predictive models	Model tuning and evaluation practice
6	Nov. 23–29	Boosting methods for classification and regression; learning rates, tree depth, and model tuning	Boosting practice
7	Nov. 30–Dec. 6	Principal components analysis; dimension reduction; time series modeling, ACF, PACF, and fitted time series models as time permits	Final project preparation
8	Dec. 7–12	Clustering; linear discriminant analysis; course synthesis and model comparison	Final project

Administrative Requirements

Makeup Classes

Make-up opportunities are only allowed with an excused absence (Note: Job or anything work related is not an excused absence). The instructors will follow all university policies regarding making up work due to absences for religious holidays or school-sponsored athletic and extracurricular activities.

Netiquette

It can be easy to forget that real people are reading our messages. In online communication, readers cannot see your body language or hear your tone, so a message may come across differently than you intended. Read each post or message before sending it, and communicate with the same care and respect you would use in person. Additional guidance is available in UNLV's [online netiquette resource](#).

Respect everyone participating in this learning community by:

- Honoring each person's right to an opinion
- Respecting the right of others to disagree
- Responding honestly, thoughtfully, and respectfully without using foul or abusive language
- Signing your name to each contribution you choose to make
- Protecting your privacy and the privacy of others by not sharing information that is private or potentially embarrassing
- Being constructive when responding to others in the class
- Being willing to clarify a statement that others may have misunderstood or misinterpreted

Special Note about Anger

Do not send a message while you are angry. Step away, reread it later, and make sure it says what you actually mean. Avoid writing in all capital letters because readers interpret it as shouting and may see it as aggressive.

Office Hours and Course Questions

Electronic mail can be effective for many types of communication. What should you do if you are having a problem with some aspect of the course? First, you should check your syllabus and course schedule. If need be, please contact your instructor within scheduled office hours to speak on the phone or to schedule an in-person virtual meeting (must schedule 24 hr prior) to discuss. Email is the best way to schedule a proposed meeting as the instructor is not always in the office during "office hours."

The instructor will check emails and answer questions during the office hours listed at the beginning of the syllabus. If you email after that time you may not get a response until the next office hours. Emails sent after office hours on Friday will not be responded to until Monday office hours, do not leave questions until right before an assignment is due.

Format for Written Assignments

Points will be deducted for assignments that do not follow the requirements below or look unprofessional. Unless an assignment states otherwise, submit both a rendered PDF report and the complete `.Rmd` source file used to produce it. It is your responsibility to ensure that both files can be opened and that the `.Rmd` file reproduces the submitted report.

- 12-point Times New Roman font with 1-inch margins.
- 8 $\frac{1}{2}$ x 11 paper, portrait orientation
- 1.5-inch spacing
- Use tables to display data or small amounts of information in categories.
- Use headings and subheadings to organize information.

- Use bullet points and short, focused paragraphs instead of lengthy discussions.
- To obtain a high grade for your effort it is highly recommended you proofread before submitting your assignment.
- Check grammar, punctuation, and spelling.
- Your name should be on every assignment submitted
- The PDF should answer each question in the order presented and include readable, labeled tables and figures.
- The .Rmd file should include all code needed to reproduce the analysis and report.
- All group assignments should have a cover sheet listing the names, positions and contributions of each member.
- References must be in APA format and must include a title, date and author even if they are from the internet. References simply listed with web addresses will receive no credit. Visit www.apastyle.org for more information. Any text with more than 6 words quoted from another source must be in quotes and referenced correctly.

Copying material greater than 6 words is not permitted, even with a citation. Paraphrase your support materials. Failure to follow this rule will be considered plagiarism and reported to Academic Affairs.

Teaching Practices

As UNLV Hospitality College faculty members, we aim to create a positive learning environment that helps students learn effectively and develop into hospitality and tourism professionals. We will:

- Treat students with respect and integrity while maintaining professional relationships centered on their learning and best interests
- Set clear and consistent expectations for coursework, behavior, timekeeping, and professionalism, and address concerns fairly and sensitively
- Prepare thoroughly, stay current in the subject and its teaching practices, and present course material from a broad and practical perspective
- Encourage students to think critically and creatively, apply what they learn, and move beyond memorization and textbook knowledge
- Use clear communication, varied teaching strategies, and appropriate resources to support different students and learning needs
- Provide meaningful and timely feedback, consider student input, and reflect on our own practice to improve teaching and learning

Students are expected to follow the [UNLV Student Conduct Code](#).

University Policies

- [Academic Policies](#)
- [Hospitality Student Handbook \(PDF\)](#)
- [University Policies webpage](#)
- [Copyright policy information](#)

Accessibility

UNLV and the [Nevada System of Higher Education](#) require digital educational materials, including syllabi, to be accessible, in alignment with equal opportunity mandates by the Americans with Disabilities Act (ADA). The [Office of Accessibility Resources](#) offers [interactive training sessions](#) to help UNLV personnel create digital syllabi and other educational materials in accessible formats. For more information, contact the Office of Accessibility Resources.

Americans with Disabilities Act Accommodations

For all accommodation determinations allowed under the Americans with Disabilities Act, please contact the [Disability Resource Center](#), located in the Campus Resource Center (CRC), across Harmon from the Lied Library, telephone (702) 895-0866.

Responsible Use of Generative AI

I encourage students to use generative AI and other technology when it helps them learn, but I will not accept AI slop. AI slop includes generic filler, irrelevant material, invented facts or citations, careless analysis, writing that does not answer the question, or any work that the student cannot explain and defend. Submitting pages of unreviewed AI output is not a responsible use of the tool. If you use AI, verify the information, internalize the material, and rewrite it in your own words and voice. Include a brief disclosure that identifies the tool and explains how you used it.

Work that contains AI slop will receive an immediate grade of 0%. The student will be given an opportunity to redo the assignment using the feedback and deadline I provide. In the real world, you cannot send careless AI output to a client, boss, or customer. The same standard applies in this class. I also consider it disrespectful to expect someone else (like myself) to spend time reading pages of material that you did not take the time to review yourself.

Collaboration and Academic Integrity

The permitted level of collaboration will be stated for each assessment. Discussion and peer learning may be encouraged, but individually submitted work must represent the student's own analysis and writing unless group work is explicitly authorized. Sharing completed answers, submitting another person's work, allowing one's work to be copied, fabricating results, or presenting ideas or language without appropriate attribution may constitute academic misconduct.

Assignment instructions may set additional requirements for collaboration, generative AI, or automated coding tools. Students remain responsible for the accuracy, reproducibility, attribution, and integrity of everything they submit.

Additional University Policies and Resources

Religious Holidays and University-Sponsored Activities

Notify the instructor in writing within the timeframe required by university policy if a religious observance or authorized university-sponsored activity will affect attendance or coursework. Reasonable opportunities to complete affected work will be provided in accordance with university policy.

Academic Support and Writing Assistance

UNLV provides academic assistance through the Academic Success Center and writing support through the Writing Center. Students are encouraged to use these services before difficulties become urgent. See <https://www.unlv.edu/asc> and <https://writingcenter.unlv.edu/>.

Syllabus Acknowledgment

Enrollment in the course signifies responsibility for reading this syllabus, consulting the detailed instructions and deadlines in WebCampus (Canvas), and asking questions when expectations are unclear. The instructor may revise the syllabus when necessary; material changes will be communicated to the class.