Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Computer Application in Food Sciences
Course code	44741
Scientific sector	-
Degree	Food Sciences for Innovation and Authenticity
Semester	I
Year	1
Academic Year	2024/25
Credits	3
Modular	No

Total lecturing hours	30
Total lab hours	
Total exercise hours	
Attendance	**In-person attendance is recommended**. **Lectures recording.** While in-person attendance is recommended, lectures are also recorded and offered online (recordings become available the day after the lecture's date) to accommodate students with scheduling or geographical constraints.
Prerequisites	The course is designed to accommodate students with varying levels of expertise. Familiarity with statistical software (e.g., MS Excel or similar) would be beneficial but not mandatory. Some students may have used other statistical tools, which can provide a helpful perspective when learning R.
Course page	

Specific educational objectives	By the end of the course, students should be proficient in using the R programming language for data manipulation, statistical analysis, and data visualization. They should be able to write and execute R scripts to solve food science-related problems.

Lecturer	Matteo Scampicchio, matteo.scampicchio@unibz.it
Scientific sector of the lecturer	AGR/15
Teaching language	English
Office hours	Monday, 13-14 or previous appointment
Teaching assistant *(if any)*	
List of topics covered	The list of topics covered in the course "Computer Applications in Food Processing" can be outlined as follows: **1. Introduction to R** ❖ Introduction to R programming language

	❖ R environment setup and installation ❖ RStudio overview and usage ❖ Basic R syntax and data structures ❖ Basic statistical tests: t-test, ANOVA, linear regression **2. Data Visualization with R** ❖ Data visualization principles and best practices ❖ Creating basic plots ❖ Customizing plots ❖ Visualizing distributions and trends ❖ Creating interactive and dynamic plots using Shiny **3. Exam Simulation** ❖ Practice exam to assess students' understanding and application of R and data analysis techniques in food science
Teaching format	The teaching format for the course "Computer Applications in Food Processing" is designed to emphasize a hands-on learning approach, where students actively work with R and perform data analysis tasks. Practical exercises, case studies, and real-world projects allow students to apply concepts immediately and reinforce their understanding. Demonstrations of R code and data visualization techniques will be done in real-time, making the learning process more dynamic. Incorporating group activities and case studies fosters collaboration and critical thinking. Students can work together to solve complex food science problems using R, encouraging teamwork and knowledge sharing. Students will have access to resources such as R tutorials, coding examples, and relevant food science datasets enables self-learning and exploration beyond the classroom.

Learning outcomes	**1. Knowledge and Understanding:** ❖ Understand the fundamentals of the R programming language and its applications in food science. ❖ Gain knowledge of data visualization techniques using R for effective representation of food science data. ❖ Acquire knowledge of statistical methods and tests for analyzing food science data in R. **2. Applying Knowledge and Understanding:** ❖ Apply R programming skills to manipulate, clean, and preprocess food science datasets for analysis. ❖ Utilize data visualization techniques in R to explore patterns, trends, and relationships in food science data. ❖ Apply statistical methods in R to make evidence-

	based decisions for quality control, authenticity assessment, process innovation, and optimization in food processing. **3. Making Judgments:** ❖ Evaluate and interpret data visualizations to draw meaningful insights and conclusions about food science processes and products. ❖ Make informed judgments about the suitability of different statistical techniques for specific food science research questions.

Assessment	The final assessment for the course "Computer Applications in Food Processing" consists of a comprehensive and practical examination that evaluates students' understanding and application of the concepts and skills covered in the course. The format for the final assessment includes: **1. Quiz (grade up to 24 points out of 30)** This is a written quiz that include a mix of multiple-choice questions, short-answer questions related to R programming, data visualization, and statistical methods applied to food science. **2. Practical Data Analysis Project (6 additional points)** Students receive a real-world dataset related to food processing, quality control, authenticity assessment. They will be required to perform data analysis using R to answer specific research questions or solve food science problems. The project should involve data cleaning, manipulation, visualization, and statistical analysis, demonstrating the application of R skills in food science contexts.
Assessment language	English
Evaluation criteria and criteria for awarding marks	**1. Quiz Evaluation Criteria:** Marks are awarded based on correct answers of the multiple-choice quiz. **2. Practical Data Analysis Project Evaluation Criteria:** Marks are awarded for accuracy in the preparation of the R script, appropriateness of data visualizations and application and accuracy of statistical methods in R and the ability to interpret the findings from their data analysis **Award:** students may receive additional credits for demonstrating excellence in their answers.

Required readings	**1. R and RStudio:** ❖ R is a free, open-source statistical programming

	language, and RStudio is an integrated development environment (IDE) for R. Students should install both R and RStudio on their computers to practice coding and data analysis. ❖ R Download: https://cran.r-project.org/ ❖ RStudio Download: https://www.rstudio.com/products/rstudio/download/
Supplementary readings	For the course "Computer Applications in Food Processing," there are several excellent materials, references, websites, online tutorials, and books that can help students deepen their understanding of R programming, data analysis, and its applications in food science. Here are some of the best resources: **1. General Websites and Online Tutorials:** ❖ RStudio's Official Website: https://www.rstudio.com/ ❖ R for Data Science (R4DS) by Hadley Wickham and Garrett Grolemund: https://r4ds.had.co.nz/ ❖ R Graphics Cookbook by Winston Chang: http://www.cookbook-r.com/Graphs/ ❖ RDocumentation: RDocumentation is a central repository of R packages and functions documentation. It's a valuable resource for understanding how to use different R functions. Website: https://www.rdocumentation.org/