Lecture 0

Course Information

MATH 8090 Time Series Analysis
August 19, 2021

Whitney Huang
Clemson University

About the Instructor

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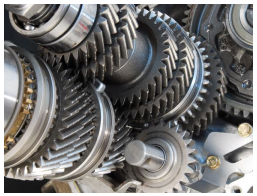
- Third-year Assistant Professor of Applied Statistics and Data Science
- Born in Laramie, WY, grew up in Taiwan

- Obtained a B.S. in Mechanical Engineering, switched to Statistics in graduate school



- Got a Ph.D. (Statistics) in 2017 at Purdue University.

How to reach me?

- **Email:** wkhuang@clemson.edu

  Please include [MATH 8090] in your email subject line

- **Office**: O-221 Martin Hall

- **Office Hours**: Tue./Thurs 12:30pm - 1:15pm and by appointment

Class Policies

Logistics

- There will be two 50-min exams. The (tentative) dates are:
  - **Exam I**: Sep. 30, Thursday
  - **Exam II**: Nov. 4, Thursday
- There will be a final project due on Dec. 8 (Wed.) 5:30pm. It could be a **data analysis**, a **simulation study**, **methodological or theoretical research**, or a **report on a research article** of interest to you. Topics for the project must be approved by me no later than Nov. 9 (Tue).
- There will some homework assignments:
  - To be uploaded to Canvas by 11:59 pm ET on the due dates
  - Worst grade will be dropped

Evaluation

Grades will be weighted as follows:

Homework	30%
Exam I	15%
Exam II	15%
Final Project	40%

Final course grades will be assigned using the following grading scheme:

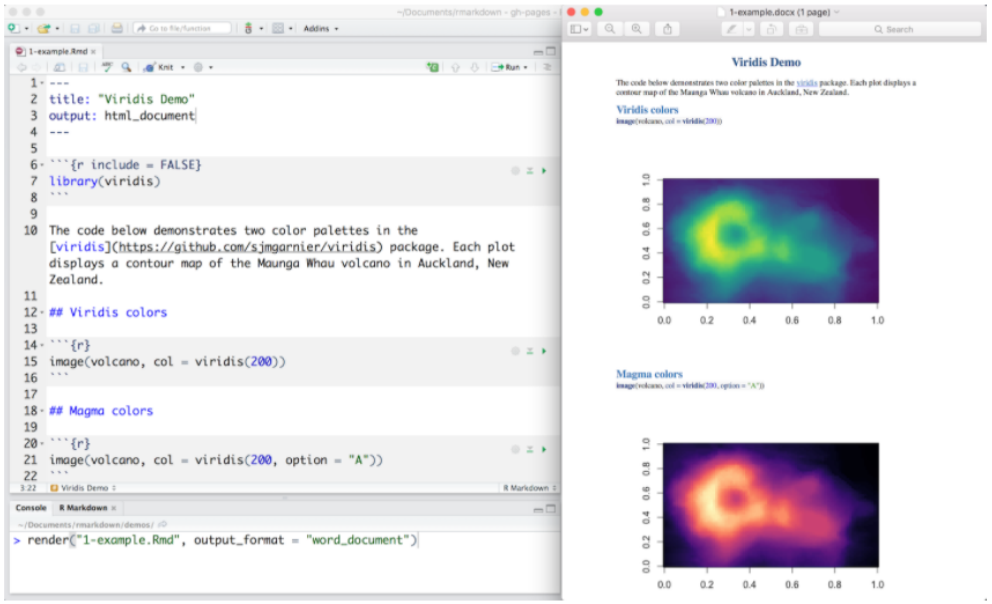
>= 90.00	A
88.00 ~ 89.99	A-
85.00 ~ 87.99	B+
80.00 ~ 84.99	B
78.00 ~ 79.99	B-
75.00 ~ 77.99	C+
70.00 ~ 74.99	C
68.00 ~ 69.99	C-
<= 67.99	F

Computing

We will use software to perform statistical analyses.

Specifically, we will be using `R/Rstudio`

- a **free/open-source** programming language for statistical analysis
- available at `https://www.r-project.org/` (`R`); `https://rstudio.com/` (`Rstudio`)
- I strongly encourage you to use **`R` Markdown** for homework assignments



Course Materials at CANVAS

- Course syllabus / Announcements
- Lecture slides/notes/videos
- R Labs
- Data sets for lectures and labs

Course Website

CLEMSON UNIVERSITY

Link: https://whitneyhuang83.github.io/MATH8090/Schedule.html

MATH 8090 Time Series Analysis, Forecasting and Control

Contact Information

Instructor: Whitney Huang
Email: wkhuang@clemson.edu
Office Hours: or by appointment (in person or via Zoom)
Syllabus:Link

Announcements

- Welcome to MATH 8090!

Schedule

Week	Date	Topic	Lecture Notes	R Code	Homework Assignments/Labs	Exam/Project
1	Aug. 19	Overview of the course	Course information; Slides 1	HTML; Code	R Lab1; Suggested solutions; **Due: Aug. 27**	
2	Aug. 24 and Aug. 26	Estimating trend and seasonality	Slides 2	HTML; Code		
3	Aug. 31 and Sep. 2	Stationary processes	Slides 3	HTML; Code		
4	Sep. 7 and Sep. 9	ARMA models Part I	Slides 4	HTML; Code		
5	Sep. 14 and Sep. 16	ARMA models Part II	Slides 5	HTML; Code		
6	Sep. 21 and Sep. 23	ARMA models III	Slides 6	HTML; Code		
7	Sep. 28 and Sep. 30	Nonstationary time series models	Slides 7	HTML; Code		Exam I: Sep. 30
8	Oct. 5 and Oct. 7	Seasonal time series models	Slides 8	HTML; Code		
9	Oct. 14	Regression with time series errors	Slides 9	HTML; Code		
10	Oct. 19 and Oct. 21	GARCH models	Slides 10	HTML; Code		
11	Oct. 26 and Oct. 28	Extreme value analysis	Slides 11	HTML; Code		
12	Nov. 2 and Nov. 4	Spectral analysis of time series I	Slides 12	HTML; Code		
13	Nov. 9 and Nov. 11	Spectral analysis of time series II	Slides 13	HTML; Code		
14	Nov. 16 and Nov. 18	State-space models	Slides 14	HTML; Code		
15	Nov. 23	Further topics	Slides 15	HTML; Code		
16	Nov. 30 - Dec. 2	Review	Slides 16	HTML; Code		
17	Dec. 8	Final Exam 3:00pm - 5:30pm				Final Project Due

Reference Books

- *Introduction to Time Series and Forecasting,* 2_{nd} Edition, **Peter Brockwell and Richard Davis, 2013** [Link]
- *Time Series Analysis and Its Applications With* R *Examples,* 4_{th} Edition, **Robert Shumway and David Stoffer, 2017** [Link]
- *Time Series Analysis with Applications in* R*,* 2_{nd} Edition, **Jonathan Cryer and Kung-Sik Chan, 2008** [Link]
- *Time Series Analysis: Forecasting and Control,* 5_{th} Edition, **George Box, Gwilym Jenkins, Gregory Reinsel, Greta Ljung, 2015** [Link]
- *Analysis of Financial Time Series,* 3_{rd} Edition, **Ruey Tsay, 2010** [Link]
- *Climate Time Series Analysis: Classical Statistical and Bootstrap Methods,* 2_{nd} Edition, **Manfred Mudelsee, 2013** [Link]

Tentative Schedule

Week	Dates	Topic
1	8/18-20	Overview of the course
2	8/23-27	Estimating trend and seasonality
3	8/30-9/3	Stationary processes
4	9/6-10	ARMA models I
5	9/13-17	ARMA models II
6	9/20-24	ARMA models III
7	9/27-10/1	Nonstationary time series models
8	10/4-8	Seasonal time series models
9	10/13-15	Regression with time series errors
10	10/18-22	GARCH models
11	10/25-29	Extreme value analysis
12	11/1-5	Spectral analysis of time series I
13	11/8-12	Spectral analysis of time series II
14	11/15-19	State-space models
15	11/22-23	Further topics
16	11/30-12/3	Review