Name of the program:	MSc program in Applied Statistics		
Department:	Department of Statistics		
Semester:	Semester 1		
Year:	2020		
Course Code:	STA 517 3.0		
Course Name:	Programming and Statistical Computing with R		
Credit Value:	3.0		
Core/Optional	Core		
Hourly Breakdown	Theory	Practical	Independent Learning
	15	30	105

Course Aim/Intended Learning Outcomes:
At the completion of this course student will be able to
- ❏ Navigate the R integrated development environment (IDE) R Studio.
- ❏ Execute basic arithmetic operations in R.
- ❏ Define data classes, object attributes, data structures in R.
- ❏ Write user-defined functions to solve a given problem in R.
- ❏ Solve fundamental error problems and bugs in R programs.
- ❏ Describe the principles of the tidyverse programming.
- ❏ Use the tidyverse packages in data science workflow.
- ❏ Perform data wrangling with R.
- ❏ Create data graphics using ggplot2 package.
- ❏ Select effective visualisations to understand relationships between variables.
- ❏ Perform functional programming with R.
- ❏ Generate data from a given distribution.
- ❏ Use statistical simulation for estimation and hypotheses testing.

Course Content: (Main topics, Sub topics)

R programming basics
- Introduction to R and Rstudio
- Setting a working directory
- Variable assignment
- Objects in R
- Installing packages

Data structures
- Matrices, Arrays, List, Data frames, Factors
- Sub-setting

Mathematical and statistical functions in R

- Logical operators
- Matrix operations
- Probability distribution functions

Writing functions in R

- Main components of a function
- Control structures
- Debugging functions

Programming with the tidyverse

- Data import and export
- Data wrangling
- Data visualization
- Statistical modelling and functional programming in R
- Dynamic reproducible reporting

Statistical simulations

- Methods of generating random numbers
- Monte Carlo methods in inference
- Bootstrap and Jackknife

Teaching /Learning Methods: Lectures and student-centered teaching learning methods
Mode of Delivery:
All lectures will be delivered using online teaching methods till the university grants permission to conduct face-to-face lectures for postgraduate students.

Assessment Strategy:

Continuous Assessment 30%	Final Assessment 70%		
quizzes %, mid-term %, other % (specify)	Theory (%)	Practical (%)	Other (%)(specify)
100%	10%	90%	0%

References/Reading Materials:

Hadley Wickham, Garrett Grolemud, The R for Data Science, O'REILLY

Garrett Grolemud, Hands-On Programming with R, O'REILLY

Maria L. Rizzo, Statistical computing with R, Chapman & Hall

Course website: https://thiyanga.netlify.app/courses/rmsc2020/

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Prepared by Dr Thiyanga S Talagala, 2020