

<b>Name of the program:</b>	MSc program in Applied Statistics		
<b>Department:</b>	Department of Statistics		
<b>Semester:</b>	Semester 1		
<b>Year:</b>	2021		
<b>Course Code:</b>	STA 517 3.0		
<b>Course Name:</b>	Programming and Statistical Computing with R		
<b>Credit Value:</b>	3.0		
<b>Core/Optional</b>	Core		
<b>Hourly Breakdown</b>	<b>Theory</b>	<b>Practical</b>	<b>Independent Learning</b>
	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)  100%	Theory (%)  10%	Practical (%)  90%	Other (%) (specify)  0%

References/Reading Materials:

- ☐ Hadley Wickham, Garrett Golemud, The R for Data Science, O'REILLY
- ☐ Garrett Golemud, Hands-On Programming with R, O'REILLY
- ☐ Maria L. Rizzo, Statistical computing with R, Chapman & Hall
- ☐ Course website: <https://hellor.netlify.app/mscschedule/>