**R Training Programme – September-October 2017**

**Department of Infectious Disease Epidemiology, Imperial College London**

**Part I**

Day 1 - Tue 26 September MSc Room

Day 2 - Wed 27 September MSc Room

Day 3 - Thu 28 September Praed Street meeting room

**Part II**

Day 4 - Tue 17 October Library Training Room (1st floor)

Day 5 - Wed 18 October Praed Street meeting room

**Trainer:**

Jamie Owen (Jumping Rivers)

**Attendees:**

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| Zulma Cucunuba | Alexandra Hogan |
| Margaret De Villiers | Nicholas Letchford |
| Ilaria Dorigatti | Xiang Li |
| Tini Garske | Ed Parker |
| Katy Gaythorpe | Romain Silhol |

**Schedule for each day:**

Tea/coffee 09:00 – 09:10

Morning session 09:10 – 10:45

Tea/coffee 10:45 – 11:00

Morning session (cont.) 11:00 – 12:30

Lunch 12:30 – 13:30

Afternoon session 13:30 – 14:45

Tea/coffee 14:45 – 15:00

Afternoon session (cont.) 15:00 – 17:00 (16:30 finish on Days 3 and 5)

**Part I**

**Day 1 – Tuesday 26 September**

**MSc Room**

**Morning: Programming with R (Review)**

Participants should be familiar with the basics.

* Conditionals: using if() and else() statements in R
* Functions: what is function is, how are they used, and how can we construct our own functions.
  + Messages, warnings and errors
  + The invisible() function, e.g. the hist() function
  + Using on.exit()
* Looping in R: an introduction to the concept of looping in R. In particular for() and while() loops.
* The apply functions: apply(), tapply() and other members of the apply family.

**Afternoon: How to set up an analysis**

* The current working directory - getwd()
  + Avoiding setwd()
* File extensions
  + Naming files
* Using an RStudio project
  + Directory layout: input/, R/, output/, graphics/
  + Absolute vs relative paths
* Where to find help, e.g Stackoverflow
  + How to ask a question

**Day 2 – Wednesday 27 September**

**MSc Room**

**knitr**

* Introduction to git
  + Basic commands commit, push/pull, and status
  + Using GitHub
  + **Aim**: The general idea will be to have participants commit/push their reports to a GitHub repository.
* Automated reporting
* Rmarkdown Creating documents using Markdown
* **knitr** Running dynamic R code
* Widgets: HTML widgets
* Building and deploying apps Via the web and dropbox
* Latex A brief introduction to latex for additional styling

**Day 3 – Thursday 28 September**

**Praed Street meeting room (large)**

**The grammar of graphics**

* The grammar of graphics
* Groups, geoms, stats and layers
* Scales, axes and legends
* Facets & **ggjoy**
* Themes
* Depending on progress, some **plotly**
* Bring your data!

**Part II**

**Day 4 – Tuesday 17 October**

**Library Training Room**

**Basic SQL training**

* Using **dplyr**
  + the key verbs
  + the explain() function
* Basic join types select/ join/from/where/group by/order by
* Pulling data from the data base
* Insert and other data modifying operations
* Transactions

To avoid issues with licences, we will run this day using a RStudio hosted on Amazon AWS.

More advanced git concepts may also be covered.

**Day 5 – Wednesday 18 October**

**Praed Street meeting room (large)**

**Shiny**

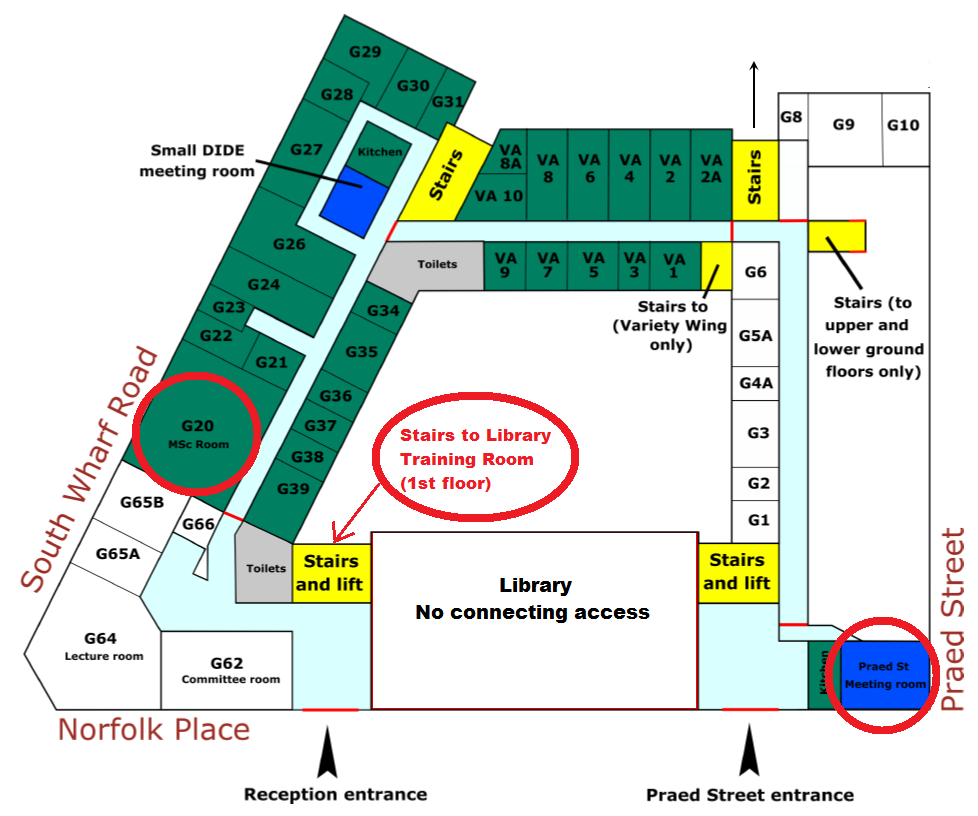
* Interactive graphics with shiny
* Introduction to Shiny and html: Introduction to the server and ui files
* Building and deploying apps
* Reactive programming: Creating dynamic graphics.

**Advanced R programming**

To be covered only if time allows:

* Functions:
  + Scoping rules (including lexical scope)
  + The ... argument
  + Functions as first class objects
  + Functions closures and mutable states
  + Argument matching
* Customising your workspace:
  + The .Rprofile and .Renviron files
  + Dealing with errors
  + Using try and tryCatch effectively
* S3 classes:
  + Introduction to object oriented programming
  + Constructing S3 objects
  + Drawbacks
* S4 and reference classes:
  + Creating and using S4 and reference classes
  + Difference between S3 and S4

**Building map (ground floor)**

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