

# 2021 R and Math Summer Camps: Two (p)refresher workshops for graduate students

August 16 to 20, August 23 to 26  
ONLINE / VIA ZOOM

*Faculty Advisors:*

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Quantitative approaches comprise a large and growing part of social science and humanities research. It is increasingly difficult to take graduate level courses and read important papers in your field without an understanding of statistical inference, programming, and mathematical models. McGill offers a wide range of courses to give you competency in these areas, but sometimes graduate students feel inadequately prepared to take advantage of these resources.

To help you make the most of your studies, we offer two week-long workshops before the beginning of fall term. The workshops assume no background! We encourage you to take both workshops, particularly if you are an incoming graduate student, but you can also register for only one workshop. Detailed outlines of each syllabus will be available later in the summer.

The workshops are supported by the Faculty of Science, the Faculty of Arts, the Department of Political Science and Sociology, the Desautels Faculty of Management, the Consortium on Analytics for Data-Driven Decision-Making (CANd3), the Institute for Epidemiology, Biostatistics and Occupational Health, the Centre for the Study of Democratic Citizenship (CSDC) and the Geographic Information Centre (GIC).

## **Workshop I: Introduction to data science in R and documenting in RMarkdown**

This workshop will introduce you to R, a common statistical programming language used across many courses at McGill as well as RMarkdown (typesetting language useful for producing documents that contain mathematical content and code). These are very useful and powerful tools but they have somewhat of a steep learning curve. So, the goal of this part of the workshop is to get you up a good part of that learning curve.

- Day 1: Introduction to the basics of R and the graphical user interface RStudio
- Day 2: Working with data (cleaning, pre-processing, dealing with missing values)
- Day 3: Visualizing data and producing graphs
- Day 4: Statistical prequel and more tips and tricks on working with R
- Day 5: Typesetting using RMarkdown and RStudio Add-Ins

The workshop will take place from *Monday, August 16 to Friday, August 20* by means of *remote teaching* between 9:30 am and 4:00 pm. The instructor is *Dr. Tim Elrick*, Director of the Geographic Information Centre at McGill. He will be supported by teaching assistants who will make sure you

won't get stuck. We also will make sure that the online units will be reasonably long with enough breaks to get away from the screen.

## Workshop II: Review of basic mathematical and statistical concepts

This workshop will (re-) introduce you to notation commonly used in statistics, cover functions, basic calculus, probability theory, and linear algebra. Due to the compressed nature of this year's online version we may not be able to cover all topics but it will likely be a mix/selection of the following:

- Review of basic Algebra, functions, notation (Greek letters)
- Basic Probability and statistical concepts
- Calculus: Functions, derivatives, integrals
- Linear Algebra: Vectors, matrices, matrix multiplication

The workshop will take place from *Monday, August 23 to Thursday, August 26* and will be taught by *Ann-Marie Helou*, a PhD student in the department of sociology with support from TAs. The exact format is to be determined but probably short lecture sessions with time to do problem sets (outside if the weather is good).

**Prerequisites:** NONE! If you never heard of these topics you should not be scared off. In fact, you are the perfect student for this workshop. The goal is to give you a basic overview of the material as well as the resources and the confidence to learn more. If you already have some background, but have not used this material recently, these workshops will also be useful.

**Registration:** The workshops are free to attend for all McGill students and members of the CSDC. If demand exceeds capacity, we will give preference to incoming graduate students. We will start forming the courses in early August. To be guaranteed consideration **register before July 31** at this link: <https://forms.office.com/r/Z7348qjscJ>



**Format and Policies:** Due to the uncertainty around COVID-19 the workshops will be conducted online via zoom (for the last time, we hope!). Refer to the description of the workshops for information on format. Details will be communicated later in the summer. These workshops are *not for credit* and there are no exams. Still, taking the workshop will require a commitment. The sessions will involve a mix of lecture and hands-on practice. Just like any skill, you can't learn math and computing by just watching. You have to do it to learn it.

We expect, you attend all sessions, do any readings we assign and participate in all aspects. If you register but your plans change, that's fine, but we expect that you inform us; simply not showing up you will waste our efforts and resources.

*For any questions, e-mail us at [gicsupport@mcgill.ca](mailto:gicsupport@mcgill.ca). Please put "summer camp" in the subject line. It will help us to reply to you quicker. Thank you.*