Before applying for any summer/winter programme, read the GRO website and i-SP Application Guide for important information on:

- General Eligibility Requirements and Application Process
- Module Mapping and Financial Aid
- Visa Application, Travel Advisories and Student Insurance

University of Geneva (UniGE) Summer Schools: Data Analytics
(Updated as of 6 January 2020)

Programme Website: [https://www.unige.ch/genevasummerschools/index.php?cID=266](https://www.unige.ch/genevasummerschools/index.php?cID=266)

Programme Location: Geneva, Switzerland

Programme Dates:
- Module 1: 22 June - 3 July 2020 (2 weeks)
- Module 2: 6 – 10 July 2020 (1 week)
- Module 3: 13 – 17 July 2020 (1 week)

Application Deadline: 1 April 2020

No. of Placements: To be determined by the host university

### ESTIMATED COST OF PARTICIPATION

<table>
<thead>
<tr>
<th>1</th>
<th>Programme Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1</strong> (weeks 1 and 2) 22 June - 3 July 2020</td>
<td><strong>Module 2</strong> (week 3) 6 – 10 July 2020</td>
</tr>
<tr>
<td>CHF 2,000*</td>
<td>CHF 1,000*</td>
</tr>
</tbody>
</table>

Module 1 + Module 2 + Module 3
22 June – 17 July 2020
(4 weeks in total, 12 ECTS)
CHF 3,400*

Module 1 + Module 2
22 June – 10 July 2020
(3 weeks in total, 9 ECTS)
CHF 2,700*

Module 2 + Module 3
6 – 17 July 2020
(2 weeks in total, 6 ECTS)
CHF 1,800*

*Including 100 CHF non-refundable administrative fees
2 Projected Expenditure

Please note that below are estimates for reference only. The actual costs of living will depend on personal lifestyles and preferences, as well as the leisure travelling.

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programme Fee</td>
<td>Varies, depending on programme</td>
</tr>
<tr>
<td>Accommodation (2-4 weeks)</td>
<td>CHF300 - 800</td>
</tr>
<tr>
<td>Transportation (per month)</td>
<td>CHF100</td>
</tr>
<tr>
<td>Meals (per month)</td>
<td>CHF450</td>
</tr>
<tr>
<td>Miscellaneous (e.g. data, groceries, shopping, cultural visits, etc)</td>
<td>CHF150</td>
</tr>
</tbody>
</table>

* estimated cost excludes airfare

3 Financial Aid Available Through NUS GRO

As a participants of this programme, you are eligible to apply for:
- NASA Enhancement Bursary (Singaporean Citizens only)
- Overseas Student Programme Loan (Singaporeans only)
- PSEA Fund Withdrawal (Singaporeans only)

PROGRAMME DETAILS

4 Academic Content

The statistical software R has come into prominence due to its flexibility as an efficient language that builds a bridge between software development and data analysis. For example, one strength of R is the facility to develop and quickly adapt to the different needs coming from the data management and analysis community while at the same time making use of other languages in order to deliver computationally efficient solutions. This course consists of three modules that can be completed separately or in succession.

Below is the course contents for quick reference:

<table>
<thead>
<tr>
<th>Module</th>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1 (weeks 1 and 2)</td>
<td>Week 1: Introduction to Data Computing with R</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>22 June - 3 July 2020</td>
<td>The course objectives and content include:</td>
<td></td>
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<tr>
<td></td>
<td>- Become proficient with tools and workflow (R programming language, RStudio development environment, RMarkdown, Git/GitHub source control, Shiny)</td>
<td></td>
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<tr>
<td></td>
<td>- Introduction to data wrangling using tidyverse tools</td>
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<tr>
<td></td>
<td>- Achieve proficiency with layered graphs &amp; data visualization</td>
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<tr>
<td></td>
<td>Week 2: R Programming for Data Science</td>
<td></td>
</tr>
</tbody>
</table>
The course objectives and content include:

- Advanced data visualization using ggplot2
- Tidy data and iteration using tidyverse: function definition, vectorized operations (e.g., `dplyr::do` and `apply` family), iteration (e.g., `mosaic::do`), non-standard data intake (e.g., web scraping & other sources)
- Statistical modeling for exploration, inference, and prediction
- Supervised learning: classification and regression modeling (e.g., decision trees, random forests, naive Bayes, neural networks), regularization, ensemble methods, model evaluation.
- Unsupervised learning: clustering, dimension reduction
- Text data in R (regular expressions, ingesting text, analyzing textual data)
- Interactive graphics and app development (e.g., Shiny, Plot.ly, ggvis)
- R for “big data” and complementary tools (e.g., python, C+)

### Module 2

**Module 2 (week 3 alone)**

6 – 10 July 2020

### Week 3: Data Analytics M2

Topics of the module include:

- Matrix algebra review using introductory R
- Introductory topics (analytics and big data, predictive models, introduction to Python, machine and deep learning packages, bootstrapping, cross validation, GLM, GAM, high dimensional data presentation, Monte Carlo methods)
- Supervised Learning (k-NN, naive Bayes, SSVM, EM algorithm, Copula based methods, regularization methods, unbalanced data, undersampling and oversampling)
- Unsupervised Learning (cluster analysis, PCA, latent variables and factor analysis, decision trees, bagging, random forests, boosting)
- Artificial Intelligence (feedforward neural nets, backpropagation algorithm, contrastive divergence (CD), stochastic MLE, score/ratio matching, pseud-likelihood estimation, annealed importance sampling, deep belief

3 ECTS
Module 3
(week 4 alone)
13 - 18 July 2020

Week 4: Time-Based Analytics
At the completion of this module, students will be able to:

- Develop basic R code in order to implement routines (functions) for (time series) data analysis.
- Plot time series in appropriate ways in order to interpret their features.
- Understand the transformations and diagnostics tools required to adequately analyse time series.
- Perform model selection and correctly interpret the output of estimation procedures for time series models.
- Make appropriate use of forecasting techniques based on the observed properties of a time series.

3 ECTS

5 Eligibility Requirements
NUS’ generic eligibility requirements apply, please see GRO website for details.

Geneva Summer Schools prefers upper-year undergraduates to apply for this programme. Course is taught in English.

A knowledge of fundamental probability and statistics concepts (e.g. acquired at a non-specialized bachelor level) as well as a beginner-level familiarity with the R statistical programming language are strongly desirable. Therefore, the course is tailored to students who have some basic experience with quantitative analysis tools and wish to increase them while extending their knowledge to the specific field of time series analysis.

6 Accommodation
Geneva Summer Schools can help facilitate your search for accommodation for your programme. We can provide you with a list of housing options and connect you with other admitted students also looking for accommodation. Please refer to https://www.unige.ch/genevasummerschools/practical-information/accommodation for details.

7 Application Procedure
You are REQUIRED TO apply via NUS’ EduRec-GE AND the host university’s online application concurrently.

Please refer to http://www.nus.edu.sg/gro/summer-winter.php (i-SP application guide) for details of the application process.
Please note that you must accept both internal offer from EduRec (for application of financial aid and to proceed with online module mapping) and external offer from the host university (and with payment of programme fees to the host university) for the summer programme before you can embark on the overseas summer programme.

8 Module Mapping

Students interested in obtaining credit can start the module mapping process after you apply in EduRec and accept the offer for the programme. Module mapping request is subject to approval from the Faculties. Click here for a step-by-step guide on applying for module mapping.

Students may map up to a maximum of 10 MCs for each Summer Programme and up to a maximum of 5 MCs for each Winter Programme. Module mapping will be subject to approval from the respective Faculties/Schools.

Students who enroll in these Programmes may request for a waiver of NUS tuition fees for the credits they wish to transfer back to NUS. This waiver applies to up to 2 Summer/Winter Programmes and up to a total of 12 MCs transferred during their course of study in NUS. Beyond that, NUS Special Term tuition fees will apply, in addition to Summer/Winter Programme fees paid to the host university. For clarification, students may contact the SEP administrators/coordinators at their respective home Faculty/School Dean’s Office or the academic department. Business courses in summer/winter programmes which are less than 3 weeks are not credit bearing.

9 Visa Application

Depending on your nationality, you need a Swiss Schengen visa to travel to Switzerland. All visa procedures remain in the participant’s responsibility and must be arranged prior to arriving in Geneva.

Please note that as Geneva Summer Schools participants you will not be official University of Geneva students.

Short-term visa applications (up to 90 days, Schengen visa) such as tourist, visit or business can be submitted online. A visa application can be submitted at the earliest 3 months before entering the Schengen area.

Participants will be provided with an email from the Geneva Summer Schools confirming their admission into the program, which includes an Admission Letter and a Tuition Invoice. They may request an official Payment Receipt once full course tuition has been paid.

Useful links:

- Overview of visa provisions according to nationality
- How to apply for a visa?
- Visa Application Forms to download and fill in online.
<table>
<thead>
<tr>
<th></th>
<th>Travel Advisories</th>
<th>Visit the <a href="https://www.mfa.gov.sg">MFA website</a> for travel advisories on various countries from the Singapore government.</th>
</tr>
</thead>
</table>
| 10 | Student Insurance | NUS students are covered under the NUS Students Travel Insurance scheme for official NUS trips. Please refer to [http://www.nus.edu.sg/finance/students/student-travel.html](http://www.nus.edu.sg/finance/students/student-travel.html) for details.  
However, students are advised to read through and understand its policy (coverage) and to review whether the terms and conditions as well as the duration of coverage are sufficient to suit their needs and to cover their entire journey abroad. If necessary, students may consider topping up for international coverage of their own health insurance or taking out a suitable travel insurance for themselves.  
If a proof of insurance (Insurance Cover for Official NUS Trips) is required at anytime, students may download the Certificate of Insurance at [http://www.nus.edu.sg/finance/students/student-travel.html](http://www.nus.edu.sg/finance/students/student-travel.html) |
| 12 | Contact Information | Questions about the programme?  
> Contact the host university at: [https://www.unige.ch/genevasummerschools/questions/contact-us](https://www.unige.ch/genevasummerschools/questions/contact-us)  
> FAQs: [https://www.unige.ch/genevasummerschools/questions/faq](https://www.unige.ch/genevasummerschools/questions/faq)  
Questions about module mapping?  
> Visit this [webpage](https://www.unige.ch/genevasummerschools/questions/contact-us).  
Questions specific to NUS GRO?  
> Contact us at: [askGRO](https://www.unige.ch/genevasummerschools/questions/contact-us) |