

# Tips to Prepare for the Statistics Master's Program at SFU

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Incoming Master's students sometimes ask their supervisors how they can prepare in advance for the program. This handout was created in response and contains suggestions from supervisors collected over the years. The department would like to thank Rachel Altman for spearheading the collection effort, putting together several earlier versions of this document and sharing her work.

## Required Courses

Typically, Statistics M.Sc. students take Statistical Theory and Linear Models in their first semester at SFU. Review of the following material prior to starting these courses may prove useful.

### 1. Statistical Theory (Stat 830)

- Course information, slides, and notes from Fall, 2013:  
[http://people.stat.sfu.ca/~lockhart/richard/830/13\\_3/index.html](http://people.stat.sfu.ca/~lockhart/richard/830/13_3/index.html)
- The probability sections of *Introduction to Mathematical Statistics* by Hogg, McKean, and Craig
- Chapters 1–3 of *Probability and Statistics* by Evans and Rosenthal
- Chapters 1–3 of *All of Statistics* by Wasserman. Also, it will likely be assumed that you can do the following problems in this book:
  - Chapter 1: Questions 5, 10–15, 17, 19, 20
  - Chapter 2: Questions 2, 4, 5, 9, 13, 14, 16–18, 20, 21
  - Chapter 3: Questions 1, 3, 4, 5, 10, 12–18, 21–24

### 2. Linear Models (Stat 850)

- The following topics (particularly **bolded** entries) found in most books on regression and ANOVA models (e.g., *Applied Linear Statistical Models, 5th Ed.* by Neter, Kutner, Nachtsheim, and Li):
  - Simple and multiple linear regression
    - \* Least squares estimates
    - \* Inference: Hypothesis tests and confidence intervals
    - \* Correlation and  $R^2$
    - \* Diagnostics
    - \* **Matrix approach**
    - \* **Random vectors, expectation, covariance matrix**
  - **Analysis of Variance**
    - \* Experiments and observational studies, **experimental units**
    - \* **Sums of squares, F-tests**
    - \* **Contrasts**
    - \* Diagnostics: **Equality of variance**, transformations

## Additional Information and Resources

1. From the beginning, expect to be engaged in writing and presenting research ideas. Opportunities to develop communication skills are available through SFU's Centre for English Language Learning, Teaching and Research (<https://www.sfu.ca/elltr/for-students/SFU-EAL-resources.html>). The Centre offers coaching, courses and workshops for graduate students on writing and speaking skills as well as a rich set of online resources.
2. For statistical computing, you'll likely use R (and possibly SAS) and for scientific computing you may use C++, C or Python. It would be helpful to learn the basics of the software before arriving. R can be freely downloaded at <http://www.r-project.org/>.
3. If your research project will involve use of compute servers, some familiarity with the basics of the Unix/Linux operating system would be helpful.
4. You will likely be using LaTeX for writing technical documents (including your M.Sc. project). A basic understanding of how to use this software will be beneficial.
5. If you will be a TA in the Statistics Workshop, review introductory statistics material (including linear regression) so that you are prepared to support students taking STAT 101, 201, 203, 270, and 302.
6. The text book *Introduction to Mathematical Statistics* by Hogg, McKean, and Craig may be helpful for learning (or re-learning) introductory material.
7. International graduate students wishing to take a paid internship through SFU's co-op work program should visit the SFU Co-op Office (<https://www.sfu.ca/coop/contact.html>) soon after arrival at SFU. Co-op work terms are normally **not permitted in the last semester** of a degree program. Even when paid by SFU, international graduate students who visit another Canadian institution to collaborate on research for longer than a couple of weeks may be required to hold an off-campus work permit; for more information see <http://www.cic.gc.ca/english/resources/tools/temp/work/unique/intern.asp>. Off-campus work permits are obtained through the SFU Co-op Office and take at least 9 weeks to secure.