practicalities of implementing these procedures in modern software practices and on developing good programming skills.

Schedule and Delivery Mode
I am going to cover aspects of both the technical and practical side of computing. Each week will be divided with two days devoted to technical aspects and one day to practical. Every Monday and Wednesday I will present lectures based on the material in Givens and Hoeting (2012). Fridays will be dedicated to allow you time to work through the assignments at your own pace while the TA and I are available to help. Even during the lectures I may ask you to run code, so please bring your laptop to every class.

Schedule
I have included a tentative schedule at the end of the course outline including a list of topics and references for each week. You may notice that there appears to be A LOT of reading. I do not expect you to read all of the reference material each week. Some of the material is important and needs to be covered before the lectures or practical sessions, and I will let you know this ahead of time. However, there is too much material for you to learn at once. One of the important skills to develop as a programmer is to learn how to find the information that you need when you need it. Most programming language, including R, are so complicated and have so many add-on packages that it is impossible to

2. Wickham, H. (2019) Advanced R. 2nd Edition. Chapman and Hall/CRC Press. Available online at https://adv-r.hadley.nz/index.html.
3. Wickham, H. and Bryan, J. (????) R Packages. 2nd Edition.
   online at https://r-pkgs.org/.
4.
   online at https://r4ds.had.co.nz/

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. If you need assistance with the course OWL site, please check the OWL Help page or contact the Western Technology Services Helpdesk at 519-661-3800 or ext. 83800.

Technical Requirements
You must bring a laptop with R version 4.2.1 installed to every lecture. You are welcome to use any operating system (Windows, MacOS, Linux, or BSD). However, you must have access to install packages in R and further software required during the semester (e.g., github).

- Git and Github

office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

https://multiculturalcalendar.com/ecal/index.php?s=c-univwo.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at

10. Course Timetable (Tentative)

Week	Topics and References (with Sections)
1) Sept 5	The Tidyverse 1: Data Exploration - Wickham 1 -- 8
2) Sept 12	Optimization 1: Univariate Problems - Givens and Hoeting 2.1 The Tidyverse 2: Wrangling - Wickham 9 18
3) Sept 19	Optimization 2: Multivariate Problems - Givens and Hoeting 2.2 RMarkdown - Wickham 26 30
4) Sept 26	EM Optimization - Givens and Hoeting 4.1 & 4.2 Git and Github 1 - Bryan 1 -- 24
5) Oct 3	Combinatorial Optimization 1: Hard Problems and Local Searches - Givens and Hoeting 3.1 & 3.2 Git and Github 2 - Bryan 25 -- 34
6) Oct 10	Combinatorial Optimization 2: Simulated Annealing and Genetic Algorithms - Givens and Hoeting 3.3 & 3.4
7) Oct 17	Numerical Integration 1: Newton-Cotes Quadrature - Givens and Hoeting 5.1 Building R Packages 1: Getting Started - Wickham and Bryan 1 -- 9
8) Oct 24	Numerical Integration 2: Gaussian Quadrature - Givens and Hoeting 5.2 & 5.3 Building R Packages 2: Metadata and Documentation - Wickham and Bryan 10 12, 16, & 17

	- Givens and Hoeting 6.1, 6.2, and 6.3 C++ in R 1 - Wickham and Grolemund 25.1 25.4

10) Nov 14	Markov chain Monte Carlo 1: MH Algorithm and Gibbs Sampling
	   - Givens and Hoeting 7.1 & 7.2
	
	C++ in R 2
	   - Wickham and Grolemund 25.5 25.7

11) Nov 21	Markov chain Monte Carlo 2: Implementation - Givens and Hoeting 7.3 Graduate Presentations
12) Nov 28	Bootstrapping 1: Basic Methods and Bootstrap Inference - Givens and Hoeting 9.1, 9.2, and 9.3 Graduate Presentations 3 & 4
13) Dec 5	Bootstrapping 2: Bootstrapping Dependent Data - Givens and Hoeting 9.5 Graduate Presentations