

**Advanced R Programming**

**Course Number:** RPROG-106
**Duration:** 4 days

**Overview**

Accelebrate's Advanced R course teaches students more sophisticated R skills, including using advanced regular expressions, machine learning, random effects modeling, Bayesian Inference, advanced R time series, and much more.

**Important Note:** We have listed more topics here than could be covered in 4 days and we would tailor the selection of topics covered to your specific needs. Please [contact us](file:////contact) for a quote and to arrange a discussion with one of our senior R instructors about customizing this class to your experience and goals.

**Prerequisites**

All students should have attended Accelebrate's [Introduction to R Programming](file:////training/r-programmers) course, or have equivalent knowledge.

**Materials**

All Advanced R training students receive comprehensive courseware.

**Software Needed on Each Student PC**

* A recent release of R 4.x
* IDE or text editor of your choice (RStudio recommended)

**Objectives**

* Use advanced regular expressions in R
* Apply advanced missing data techniques
* Work with advanced R time series
* Use data.table for big data
* Work with linear models
* Extend R to time to event and survival analyses
* Work with Bayesian Inference using R

**Outline**

* Advanced Regular Expressions in R
	+ Using Perl-Style Regular Expressions in R
* Machine Learning Approaches in R
	+ Pre-processing Data
	+ Feature Selection
	+ Supervised Learning:
		- Classification Models
		- Regression Models
	+ Unsupervised Learning:
		- Clustering
* Advanced Missing Data Techniques
	+ Understanding the different types of Missing Data
	+ Implications for Analysis
	+ The AMELIA package
	+ Multiple Imputation
* Advanced R Time Series
	+ The ts class
	+ The zoo package
	+ The xts class
	+ Lubridate for advanced date handling
	+ Autocorrelation Plots
	+ Seasonal, trend, and noise plots
	+ Financial Charting with R
* Using data.table for Big Data
	+ Why do we need data.table?
	+ Why is it
	+ The i and the j arguments in data.table
	+ Merging data with data.table
	+ Group-by functions with data.table
	+ Using data.table in functions
* Generalized Linear Models
	+ Logistic Regression
	+ Poisson Regression
	+ Gamma Regression
* Extend R to Time to Event or Survival Analyses
	+ Visualizing Hazards Across Time
	+ Understanding the Log Rank Test
	+ Cox Proportional Hazards Modeling
		- Understand Time Varying Covariates
		- Understand Time Dependent Covariates
		- Understanding the Hazard Ratio
		- Implement Frailty Models for Clustered Data
	+ Parametric Survival Models
		- Weibull Model
		- Exponential Model
		- Predicting Failure Times
* Random Effects Modeling in Linear Regression
	+ Random effects introduction
	+ Covariance structures
	+ Interpreting random effects in models
	+ Longitudinal Data
	+ Clustered Data
	+ Prediction in Random Effects
* Extension: Random Effects Modeling in Logistic Regression
	+ Random effects introduction
	+ Covariance structures
	+ Interpreting random effects in models
	+ Marginal versus Conditional Models
		- Stratified Logistic regression
		- GEE Models in Logistic Regression
* Bayesian Inference Using R
	+ Linear model
	+ Logistic Model
	+ Random Effects / Fixed effects model