

# Ghement Statistical Consulting Company

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## Advanced R Workshop - November 5 and 6, 2009

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We are pleased to announce the workshop "**Advanced Statistical Modeling Using the Statistical Software Package R**" on November 5 and 6, 2009. On both days, the workshop will take place between 8:30am and 4:30pm at the British Columbia Institute of Technology (BCIT), 555 Seymour Street, Vancouver, B.C. (This workshop is not affiliated with BCIT.)

### What is R?

R is a free, powerful, open source software package with extensive statistical computing and graphics capabilities, which can be used to explore and analyze data. R shares many of its strong points with its commercial competitor S-PLUS. In addition to providing a comprehensive suite of conventional statistical tools, R has many freely available add-in packages which can be used to carry out more specialized statistical tasks. More information on R can be found on the website [www.r-project.org](http://www.r-project.org).

### Workshop Description

Day 1 on November 5th focuses on the use of R for linear regression modeling. You will learn appropriate R commands for building simple and multiple linear regression models and performing estimation and prediction on the basis of these models. By the end of Day 1 you will master the commands needed to perform simple and multiple linear regression analyses in R and be able to interpret the resultant R output.

Day 2 on November 6th is more advanced and deals with the use of R for building a range of advanced statistical models, including generalized linear models, generalized additive models, mixed effects models, ANOVA models, time series models and multivariate data models. You will learn appropriate commands for model selection, model fitting, model validation and model inference in various settings and become familiar with the interpretation of the corresponding R output. By the end of Day 2 you will be able to use R to solve a variety of advanced statistical modeling problems.

You can choose to attend both days or either day.

### Benefits to Participants

After Day 1, you will be able to:

- Summarize and visualize your data prior to conducting simple/multiple linear regression analyses.
- Formulate simple/multiple linear regression models and fit them to your data.
- Interpret the parameters in simple/multiple linear regression models.
- Conduct statistical inference on these parameters by using confidence interval estimation and hypothesis testing.
- Use effective graphical methods for detecting violations of assumptions in simple/multiple linear regression analyses.
- Account for modeling-induced or pure residual autocorrelation.
- Detect multicollinearity and adopt measures for dealing with it.
- Use variable selection techniques to assess which variables should be included in a linear regression model and in what form.

After Day 2, you will be able to:

- Create appropriate plots of the data before and after fitting a model.
- Specify model formulae and model options in R.
- Use appropriate R functions for building generalized linear models, generalized additive models and mixed effects models, conducting analyses of variance, performing time series analyses, and carrying out multivariate analysis techniques.
- Display and interpret information about a fitted model and extract relevant R output.
- Assess the adequacy of a fitted model through appropriate model diagnostics.
- Adopt remedial actions when the adequacy of a fitted model is questionable, including data transformations, outlier removal and model updating.
- Use the fitted model as a basis for statistical inference.

## Workshop Outline

### Day 1

#### Morning

- Simple Linear Regression.
- Multiple Linear Regression.
- Regression Diagnostics.
- Qualitative Predictor Variables.

#### Afternoon

- Transformation of Variables.
- Accounting for Correlated Errors.
- Analyzing Collinear Data.
- Variable Selection Techniques.

### Day 2

#### Morning

- Generalized Linear Models.
- Generalized Additive Models.
- Mixed Effects Models.

#### Afternoon

- Analyses of Variance.
- Time Series Analyses.
- Multivariate Data Analyses.

## Workshop Format

This workshop is limited to 18 participants and consists of a series of short lectures and demonstrations followed by hands-on, interactive sessions for the participants. Each participant is provided with:

- A bound copy of the Workshop Notes;
- A CD-ROM containing all examples and exercises used during the workshop;
- 30 days of free workshop-related technical support following the workshop.

## Workshop Leader

The workshop is led by Dr. Isabella Ghement. Isabella obtained her Ph.D. in Statistics from the University of British Columbia (UBC) in 2005. Isabella has presented sold-out workshops on the statistical software package R to graduate students, researchers and others involved in cancer research, environmental and ecological research, biostatistics and bioinformatics. She also lectures

part-time on basic and advanced statistics at the Sauder School of Business at UBC. Isabella has co-authored the publications "Seasonal Confounding and Residual Correlation in Analyses of Health Effects of Air Pollution" (*Environmetrics*, Vol. 18, Issue 4, June 2007, pp. 375-394) and "Robust estimation of error scale in nonparametric regression models" (*Journal of Statistical Planning and Inference*, Vol. 138, Issue 10, October 2008, pp. 3200-3216).

## Prerequisites

### Day 1

Participants should have some basic knowledge of descriptive statistics, hypothesis testing and confidence intervals and familiarity with the statistical software package R and the Windows operating system.

### Day 2

Participants should have an understanding of statistical modeling along with some basic knowledge of the statistical software package R and familiarity with the Windows operating system.

Participants should bring a laptop computer pre-installed with the free R software. Detailed instructions for downloading and installing R are available on our website at [www.ghement.ca/Rinstructions.html](http://www.ghement.ca/Rinstructions.html).

## Location

British Columbia Institute of Technology (BCIT), 555 Seymour Street, Vancouver, B.C.  
(Workshop not affiliated with BCIT)

## Dates and Times

*Dates:* November 5 and 6, 2009.

*Registration:* On both days, workshop registration begins at 8:30 a.m.

*Times:* The workshop starts at 9:00 a.m. and finishes at 4:30 p.m. on each day.

## Cost

The attendance fee for the workshop is \$195.00 plus GST per participant per day and includes a bound copy of the Workshop Notes, a CD-ROM containing all workshop examples and exercises and 30 days of free workshop-related technical support following the workshop. The attendance fee also includes morning and afternoon coffee, tea and snacks.

If you would like us to provide a computer for you to use during the workshop please add \$100.00 plus GST per participant per day.

## Discounts

Participants who are not part of a group and attend both days receive a 10% discount.

Groups of 3, 4 or 5 from the same organization receive a 10% discount.

Groups of 6 or more from the same organization receive a 15% discount.

Groups attending both days receive an additional 5% discount.

## **Cancellation Policy**

- 100% refund if written notification of cancellation is received by October 27, 2009. Please note that no refunds will be issued after this date.
- In the event you become unable to attend after the October 27, 2009 refund deadline, you may delegate a substitute attendee. Please notify us of any changes as soon as possible via e-mail at [info@ghement.ca](mailto:info@ghement.ca) or telephone at 604-767-1250 or fax at 604-270-3922.

## **Registration**

- Places are limited to 18 participants per day so we encourage you to register early. The registration deadline is October 27, 2009.
- To reserve your place, please follow the instructions below:
  1. Pre-register by e-mailing us at [info@ghement.ca](mailto:info@ghement.ca), or telephone us at 604-767-1250, or fax us at 604-270-3922.
  2. Complete the [Registration Form](#).
  3. E-mail or fax the completed Registration Form to us, and mail your cheque payable to Ghement Statistical Consulting Company; or request us to invoice your organization where indicated on the Registration Form.
- Your reservation will be confirmed via e-mail by October 29, 2009. Please do not make any travel arrangements until your reservation has been confirmed by us in writing.
- A registration receipt will be issued to you after the workshop.

## **Registration Form**

Please [click here](#) to download the registration form. For additional attendees, please duplicate the registration form.

[http://www.ghement.ca/RworkshopNov5and6\\_2009.html](http://www.ghement.ca/RworkshopNov5and6_2009.html)