# **Excel Tutorial for 1st year Earth Science and Geography**

Author: Craig Nichol ([craig.nichol@ubc.ca](mailto:craig.nichol@ubc.ca))

Overview

This document provides some background to the project, then lists the contents of the tutorial.

Please use this shared document to provide suggestions for the Excel Tutorial.

<https://1drv.ms/w/s!AgychUGJrFtvjqJbt2DwLAsBvjDZbw>

The document is editable through the link above.

An editable copy of the spreadsheet is found here:

<https://1drv.ms/x/s!AgychUGJrFtvjqJd4eat3LMhuaoDfA>

Please not that adding lines to the spreadsheet will destroy links between instructions and editable cells. Please use comments to the side, or in cells to make suggestions, but do not change the line numbers by adding rows.

Please use comments or different colored text to indicate places where you have suggestions for the Tutorial.

**Background**

Earth Educator Rendezvous Abstract

Abstract

This Share-a-thon presentation will present and sharing of an open educational resource Excel tutorial (CC 4.0 BY NC SA). This Excel tutorial was created to introduce Earth, Environmental and Geographic science students to basic spreadsheet functions. It is written for 100 level students. The Excel tutorial will be available for every user to download prior to the Rendezvous. Participants will gain an overview of the material covered in the tutorial and how it can be incorporated into departmental or program level curriculum for developing quantitative skills.

Context

This tutorial is intended to be used by 1st year students in Earth and Environmental Science or Physical Geography. It was included as part of the Laboratory Manual for Introduction to Physical Geography, First British Columbia Edition (https://pressbooks.bccampus.ca/geoglabs2020/). In this open educational resource lab manual, instructors can choose from 22 labs. A separate Excel tutorial was developed to allow instructors flexibility in teaching labs in any order. All our departmental 100 level courses now give students access to the same tutorial. It is posted in our learning management system as an open access resource for all majors. Department instructors can specify specific sections of the tutorial as prerequisites for any particular teaching activity.

Why It Works

This self-paced spreadsheet tutorial covers the basic essential functions of Excel in one location. The whole department can refer students to a single resource, reducing the need for duplication of effort in individual courses. The tutorial being built into a spreadsheet itself makes the tutorial more hands on and more directly guided than instructions given outside the spreadsheet. Student feedback from one year of province-wide testing has been positive.

History:

This tutorial arose from different resources that had been developed for an upper level geophysics course that relied heavily upon spreadsheets for calculating and plotting data. It had become apparent in that course that some students were very proficient in using spreadsheets by 3rd year, whereas other seemed to have slipped all the way through the program and not gained much proficiency. The need for development of a consistent set of spreadsheet skills for the whole program became apparent. The timing of this coincided with the COVID pandemic in summer 2020, and the need for our 100 level labs to be moved online. This led to an effort by many of the post-secondary institutions (universities and colleges) in the province of British Columbia Canada to create new creative commons licenced laboratory materials for 100 level physical geography courses to replace aging labs of uncertain authorship and copyright status. Spreadsheet calculations were part of many labs, but each instructor writing explicit instructions would reduce the flexibility of the whole package.

The Excel tutorial was envisaged as a stand alone object that all students in a program would have access to from day one. Students could work through the tutorial self paced without instruction at any time. We keep a copy posted in our learning management system (Canvas) where we have a single course that every major in our program is enrolled in. A copy of the tutorial is posted in the Canvas Commons as a downloadable and shareable asset.

<https://lor.instructure.com/resources/675bfe63f47240b59f4fc64d255f851e?shared>

Context and Design Philosophy:

The overall goal of the tutorial was to try to hit a right combination of skills development, and brevity. Many other Excel tutorials exist as extensive recorded videos, or documents with comprehensive written instructions. These are available for those who are quite computer hesitant. It was thought that a long written or recorded tutorial would age too quickly and be too hard to keep up to date as versions of Excel change.

This tutorial was hoped to be live and interactive, and easily distributable in a single file that can be shared easily. By embedding the tutorial and the Excel functionality together, it was hoped that students would share it more easily.

Some early feedback from its first year of use is that the tutorials are quite long. Some users reported each tutorial worksheet taking them more than half an hour to work through. The tutorial divisions were intended around functionality of a particular lab in mind, where an instructor requires a basic minimum of knowledge to be able to proceed. This means that some of the early tutorial worksheets are quite long, but they are intended to get a user from nothing, to able to do a single lab without having to require multiple tutorials to be specific.

Content:

Please make suggestions for topics to include, or for different ways of organizing the material.

Tutorial 1: Basic Data Entry, Data Types and Data Display

Learning Outcomes

1. Enter simple numerical data into cells

2. Understand the display formats of simple numerical data

3. Changing the display format of simple numerical data.

4. Using scientific notation to display very large or very small numbers

5. Change the format of scientific notation numbers

6. Enter text data into cells

7 Convert text data to numerical data.

8. Set the font and font settings, the background color, and cell outlines

9. Basic copying and pasting, and how formats are pasted.

This tutorial can be assigned to users who have never used a spreadsheet. It will allow a user to enter data into a pre-prepared spreadsheet where the formulas and graphs have already been created by the instructor. The student can enter basic data.

Tutorial 2: Dates and Date Formats

Learning outcomes

1. Understand how to enter date and time data into a cell.

2. Be able to set date and time data to different display formats.

Many forms of Earth Science data are date related. Date and time are sufficiently difficult to understand in spreadsheets that they are separated into a different tutorial. This tutorial also starts to link in discussions about things such as date confusions between different systems of writing dates. This is a very common error in Earth related field data collection. In teams of people from across the globe, making sure dates are written in a clear and understandable format is key.

Tutorial 3. Basic Formulas

Learning Outcomes

1. Enter simple relative formulas

2. Change the target cells of formulas using multiple methods

3. Copying and moving formulas

4. Use Paste Special to paste values, or to paste as transposed data

This tutorial prepares students to start becoming spreadsheet creators by introducing them participating in creating new formulas. The most basic usage is for students to have their own data set of raw numbers, then to calculate through to a final result by entering their own formula.

Tutorial 4: Advanced Formulas

Learning Outcomes

1. Create relative, mixed and absolute formulas

2. Copy and move relative, mixed and absolute formulas

This tutorial introduces locking formulas to specific cells, and how to copy and paste formulas more efficiently.

Tutorial 5: Advanced Mathematics

Learning Outcomes

1. Use the mathematical functions built into the spreadsheet: Sum

2. Use the mathematical functions built into the spreadsheet: Average

3. Examine data using the built in Live Functions

4. Use trigonometric functions (Sin, Cos, Tan)

5. Use inverse trigonometric functions (ASIN, ACOS, ATAN)

6. Use power, logarithmic and natural logarithmic functions

This tutorial completes the basic set of spreadsheet skills for doing calculations. This tutorial covers some mathematics that is perhaps a bit rusty for students from a strong science background, or a bit less familiar to those with a more distant math and science background. The trigonometric functions are sometimes unfamiliar to students. Excel using Radians for calculations makes things a bit more confusing at times.

Tutorial 6: Graphing 1

Learning Outcomes

1. Create column plots from simple data

2. Create column plots with multiple data series

3. Create line graphs and understand category data on the x axis

4. Create titles and axis labels.

The tutorials from 6 to 11 deal with graphing. They begin with simple charts, and progress over time.

Tutorial 7: Graphing XY Data

Learning Outcomes

1. Create x-y plot graphs from data.

2. Setting the value ranges on x and y axes

3. Using reversed data on an axis

4. Using a logarithmic scale on an axis.

Tutorial 8: Graphing Data with Date on the X axis

Learning Outcomes

1. Use Date as the scale on the X axis of an xy chart.

2. Set date manually

Date is a difficult thing to work with in charts. The date formats for cells and chart axes are covered. This tutorial ends with another discussion about careful recording of date formats in field notes and other paperwork. That attempt here is to link the learning of these skills to real world situations students are likely to encounter in first jobs or summer employment.

Tutorial 9: Working with Chart Series

Learning Outcomes

1. Identify the data being plotted in a chart.

2. Change the data by dragging, or by editing the input line.

3. Adding a new series to a chart.

4. Add new series

5. Change the order of series on a graph

Tutorial 10: Working with Dual Y Axes.

Learning Outcomes

1. Displaying two lines on different Y axes.

Tutorial 11: Using Lines and Trendlines in XY graphs.

1. Adding lines to an xy graph

2. Adding trendlines to a graph

**Summary:**

Please feel free to comment in this document, or within the spreadsheet.

I hope that you find this resource useful.

Collaborators are always welcomed.

Author Information:

Craig Nichol, Ph.D., P.Geo.

Associate Head

Earth, Environmental and Geographic Sciences

Irving K. Barber Faculty of Science

University of British Columbia Okanagan

Science 306, 1177 Research Road

Kelowna, B.C. V1V 1V7

Tel:  250-807-8087

Email: [Craig.Nichol@ubc.ca](mailto:Craig.Nichol@ubc.ca)

<http://web.ubc.ca/okanagan/eesc/faculty/nichol.html>