

## Suggested material to review prior to attending EpiX Analytics' training courses

The following are basic topics and knowledge that we suggest that participants study prior to attending our courses. Attending our courses with this knowledge ensures that the training is focused on key risk analysis issues and is not overly hampered by teaching the basics of using Windows, Excel, or the fundamentals of probability theory. Participants intending to skip modules must *also* have the equivalent knowledge of the modules they are skipping.

### **General background**

It is helpful if participants:

- Have looked at risk analyses that have been done in their field
- Have an idea of how risk analysis could be useful to their work
- Have some prepared problems, with data if possible, that we can solve as a class exercise (more relevant for advanced courses)
- Come with a positive attitude to learn, to try, to be prepared to make mistakes, and to have fun!

### **Windows**

Creating, loading, copying, moving, renaming and saving files (and directories where applicable)  
Running programs, resizing windows, and general navigation around the windows environment.  
Decompressing files, installing software.

### **Basic probability theory**

Although this material will be covered during the class, participants should already have studied the information below, also explained in ModelAssist, chapter M0441 **sections 1-3 only**

([http://www.epixanalytics.com/modelassist/AtRisk/Model\\_Assist.htm#Probability\\_theory\\_and\\_statistics/The\\_basics/basic\\_probability\\_theory.htm](http://www.epixanalytics.com/modelassist/AtRisk/Model_Assist.htm#Probability_theory_and_statistics/The_basics/basic_probability_theory.htm)):

- Probabilities add to 1
- $P(A \text{ and } B) = P(A) * P(B)$  when events A, B are independent
- What are independent and dependent events
- $P(A \text{ and } B) = P(A) * P(B \text{ given } A)$  when events are dependent
- Relative and cumulative plots of a probability distribution
- Event trees

### **Excel**

- Navigating the spreadsheet, including arrows, END, PgDn, etc and SHIFT, ALT, and CTRL keys
- Formatting cells.
- Copying and pasting cells values and/or formats;
- Moving cells individually and in groups by dragging and cut/paste
- Fixed v relative references for cells in formulae (i.e. A1 v \$A1 v A\$1 v \$A\$1) and the effect when copy/pasting cells
- The recalculate key (F9)
- Inputting formulae (with numbers and cell references)
- Creating X-Y scatter charts, formatting them (axes, input ranges, colors of lines, etc)
- The following functions: SUM( ), AVERAGE( ), STDEV( ), STDEVP( ), RAND( ), RANDBETWEEN(), ROUND( ), IF( ), AND( ), OR( ), VLOOKUP( )
- Sorting data in ascending order using the Data/Sort facilities
- Features available with the Formula Auditing toolbar

## Specialized Excel functions

While the list above are the only functions you'll need to know before attending the course, it would be useful to be familiar with some or all of the functions below.

## Excel in general

Functions start with "="; data arrays are in curly brackets "{,.,.,}" or ranges, e.g. "A1:A4". Array formulas shown in curly brackets e.g. {=LINEST()}. To enter array formulas select a range, type the formula, and then press CTRL+SHIFT+ENTER.

## Descriptive Statistics

<b>Statistics</b>	<b>Excel 2007and earlier</b>	<b>Excel 2010 and newer</b>
Mean	=AVERAGE({x})	=AVERAGE({x})
Standard deviation (sample)	=STDEV({x})	=STDEV.S({x})
Standard deviation (population)	=STDEVP({x})	=STDEV.P({x})
Variance (sample)	=VAR({x})	=VAR.S({x})
Variance (population)	=VARP({x})	=VAR.P({x})
Skewness	=SKEW({x})	=SKEW({x})
Kurtosis	=KURT({x})+3	=KURT({x})+3
Maximum	=MAX({x})	=MAX({x})
Minimum	=MIN({x})	=MIN({x})
Median	=MEDIAN({x})	=MEDIAN({x})
Mode	=MODE({x})	=MODE.SNGL({x}) (same as MODE) =MODE.MULT({x}) (array function to deal with multiple modes (ties))
Rank	=RANK(x,array,order) <i>order: 0=descending; 1=ascending</i>	=RANK.EQ(x,array,order)
Rank percentile	=PERCENTRANK(array,x,significance)	=PERCENTRANK.EXC(array,x,significance) =PERCENTRANK.INC(array,x,significance)
Percentile	=PERCENTILE(array,k)	=PERCENTILE.EXC(array,k) =PERCENTILE.INC(array,k)
Combinations	=COMBIN(n,x)	=COMBIN(n,x)

**Distributions (return the probability mass or density at x, NOT a random value of x). Note, more are given in the course files**

<b>Distribution</b>	<b>Excel 2007and earlier</b>	<b>Excel 2010</b>
Binomial	=BINOMDIST(x,n,p,cumulative)	=BINOM.DIST(x,n,p,cumulative)
Negative Binomial	=NEGBINOMDIST(x,s,p)	=NEGBINOM.DIST(x,s,p,cumulative)
Normal	=NORMDIST(x,μ,σ,cumulative)	=NORM.DIST(x,μ,σ,cumulative)
Poisson	=POISSON(x,λ, cumulative)	=POISSON.DIST(x,λ, cumulative)
Hypergeometric	=HYPGEOMDIST(x,n,D,M)	=HYPGEOM.DIST(x,n,D,M, cumulative)
Exponential	=EXPONDIST(x,λ, cumulative)	=EXPON.DIST(x,λ, cumulative)
Gamma	=GAMMDIST(X, a, b, cumulative)	=GAMM.DIST(X, a, b, cumulative)

## Univariate regression

Coefficient	=SLOPE({y <sub>i</sub> },{x <sub>i</sub> })
Intercept	=INTERCEPT({y <sub>i</sub> },{x <sub>i</sub> })
Standard error of y	=STEYX({y <sub>i</sub> },{x <sub>i</sub> })

**Multivariate regression** ({x<sub>i</sub>} can be one or more variables. Can also make transformations e.g. ({x<sub>i</sub>}<sup>2</sup>)

Multiple regression	= { LINEST({y <sub>i</sub> },{x <sub>i</sub> }, Const, Stats)
Extrapolated series	= { TREND({y <sub>i</sub> },{x <sub>i</sub> },new-x's,constant) } <i>constant=0, c=0</i>



### **General**

Sum of an array	=SUM({x})
Sums only specific values	=SUMIF(range to evaluate, condition to sum, {x})
Logical if statement	=IF(condition, value if true,value if false)
Logical AND, OR statements	=AND(condition_1, condition_2...), =OR(condition_1, condition_2...)
Counts all numeric values	=COUNT({x})
Counts only specific values	=COUNTIF({x},condition to count)
Vertical lookup (ordered data)	=VLOOKUP(value to lookup in first column, array of data, column value to be returned)
Lookup (regardless of order)	= INDEX(array with value to be returned, MATCH(value to lookup, array of data with value to lookup,0))
Absolute value	=ABS(value)
Exponential base e	=EXP(value)
Log <sub>e</sub>	=LN(value)
Round off value	=ROUND(value,digits)
Round up value	=ROUNDUP(value,digits)
Square root	=SQRT(value).
Return an error	=NA()