# SigmaStat® 4.0

**L** et an expert guide your research analysis

SigmaStat software helps you every step of the way

**ΣIGMASTAT®**
*Advisory Statistics for Scientists*

# SigmaStat Helps You Analyze Data Confidently, Visualize Results Easily

**SigmaStat is an easy-to-use, wizard-based statistical software package designed to guide users through every step of the analysis and perform powerful statistical analysis without being a statistical expert. SigmaStat is tailored to the areas of life science and medical research, but can be a valuable product to scientists in many fields.**
**With SigmaStat, you can be confident that you have analyzed your data correctly.**
**And you save time, too!**

Because it takes you step by step through the analysis, SigmaStat ensures that you:

- Use the proper statistical method to analyze your data
- Avoid the risk of statistical error
- Interpret the results correctly
- Generate an appropriate display and a professional report

## Features that make analysis fast and easy

You don't need to know which statistical test is right for your data. Simply open the SigmaStat Advisor Wizard and answer a few questions about your data and your research project. The Advisor will suggest the appropriate statistical test. Then SigmaStat runs the test, checking your data against the test's underlying assumptions. If your data violates any of those assumptions, another test may be suggested that you can run immediately. After you run the test, you receive a report in plain English, interpreting the results. Then, with a click of a mouse, you can visualize your data in one of several pre-selected formats.
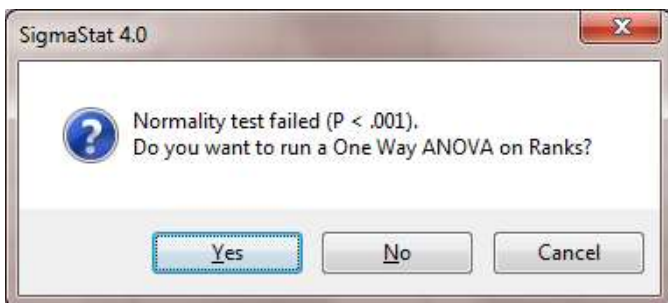


**SigmaStat automatically checks your data against the underlying assumptions for normality, equal variance, and multicollinearity. SigmaStat warns you of violations and suggests a more appropriate test when necessary.**
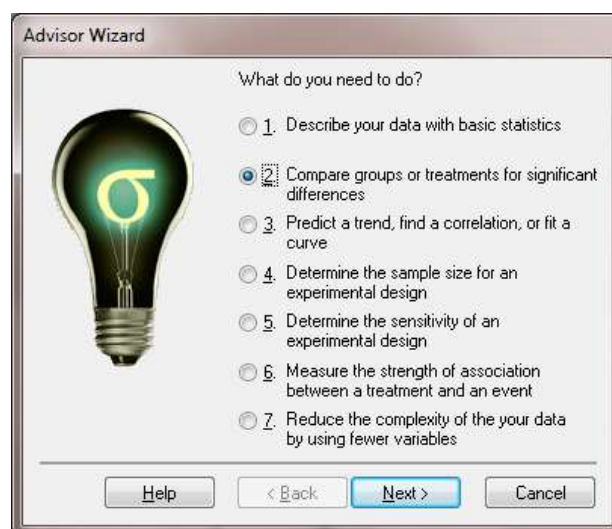


**The SigmaStat Advisor Wizard guides you through the analysis of your data.**

## Designed by scientists, for scientists

SigmaStat is used by thousands of research scientists worldwide. It can easily accommodate the vast amounts of data those today`s research projects generate. And SigmaStat includes the statistical tests and procedures most frequently used in clinical and laboratory research.

With SigmaStat, you can compare effects among groups, including before-and-after or repeated measures studies. You can also:

- Conduct survival analysis
- Analyze rates and proportions
- Perform regression and correlation analyses
- Use principle components to reduce data complexity
- Calculate power and sample size

Statistical tests - SigmaStat includes all the statistical tests most frequently used to analyze scientific research.

You can conduct regression analysis, and run analysis-of-variance analysis (ANOVA) or repeated measures against multiple groups.

**SigmaStat's ease of use makes it an ideal solution for non-statisticians to conduct statistical analyses of research data. The output   statements are obvious and make interpretation easy. Overall, SigmaStat is a user-friendly product that is instrumental to my research efforts and is ideal for anyone who requires more straightforward and intuitive statistical evaluation of their data.**

**Dr. Robert Darmody - Professor of Pedology, Department of Natural Resources and Environmental Sciences, University of Illinois**

You can also employ other types of parametric and non-parametric tests, as your research requires. And SigmaStat can accept raw or indexed data, saving you from having to reformat your data.

SigmaStat Worksheet **-** Designed to accommodate high volumes of data, the worksheet contains up to 32 thousand columns and millions of rows. You can automatically access data saved in Microsoft® Excel files or in other spreadsheet or database formats. You can navigate through the worksheet quickly and edit it efficiently, using keyboard commands found in familiar spreadsheet programs. Or select a data point or group of points in a graph and SigmaStat highlights the corresponding cell, column, or row in the worksheet to identify outliers or data entry errors.

SigmaStat Report Editor – When you conduct an analysis with SigmaStat, you receive a detailed, formatted report interpreting the results - not in statistical jargon, but in language you understand. You can print your report, incorporate it into other documents or export it in a variety of formats, including PDF and HTML.

**One Way Analysis of Variance**
**Data source:** One Way ANOVA Data in Samples.snb

**Normality Test:**          Passed   (P > 0.200)

**Equal Variance Test:**     Passed   (P = 0.178)

| Group Name | N | Missing | Mean | Std Dev | SEM | | |
|---|---|---|---|---|---|---|---|
| Species A | 4 | 0 | 4.500 | 1.291 | 0.645 | | |
| Species B | 5 | 0 | 9.400 | 2.702 | 1.208 | | |
| Species C | 5 | 0 | 4.000 | 2.236 | 1.000 | | |
| **Source of Variation** | **DF** | **SS** | **MS** | **F** | **P** | | |
| Between Groups | 2 | 86.729 | 43.364 | 8.801 | 0.005 | | |
| Residual | 11 | 54.200 | 4.927 | | | | |
| Total | 13 | 140.929 | | | | | |

**The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference  (P = 0.005).**

Power of performed test with alpha = 0.050: 0.882

All Pairwise Multiple Comparison Procedures (Holm-Sidak method):
Significance level = 0.05

Comparisons for factor: **Species**

**SigmaStat provides a written report that interprets your analysis, in terms you can understand.**

SigmaStat Result Graphs **-** You can instantly visualize the results of your analysis by clicking on one of the preselected graph types suggested by SigmaStat. You don't need to reselect data or variables - SigmaStat uses the inputs from your analysis. Then you can edit, save and distribute your graphs.

**After your analysis is complete, you can quickly visualize your data by choosing from a set of preselected "result graphs.**
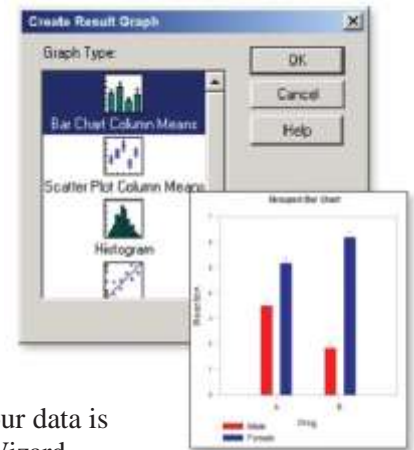
SigmaStat Graph Wizard - Another way to visualize your data is with the SigmaStat Graph Wizard. You choose the graph type – point plot, box plot, bar chart, histogram, scatterplot, step plot, and more. Then the Graph Wizard guides you through the process of selecting your data and creating your graph.

## Rely on SigmaStat

You owe it to yourself - and to your  research. With SigmaStat, you'll have the expertise of a professional statistical consultant at your fingertips. This saves time and helps you avoid statistical errors. Plus, you can share your findings quickly and easily, not only with colleagues in your lab, but with others around the world.

And SigmaStat 4.0 makes all of this easier than ever before! For more information about SigmaStat, call 1-800-797-7401 (toll-free within the U.S.) or visit https://grafiti.com/product/sigmastat-v4-0/.

# SigmaStat 4.0 Features

## BROWSER-STYLE NOTEBOOK MANAGER

- Can hold SigmaStat worksheets, Excel worksheets, reports, documents and graph pages.
- New dialog-bar-based notebook that has several states: docks, resizable, hide-able, summary information mode, etc.
- Rearrange notebook items with drag-n-drop.
- Direct-editing of notebook summary information

## DATA SELECTION

- Raw, indexed, and tabulated data
- Sample size, mean, standard deviation or standard error

## DATA WORKSHEET

- Up to 32 thousand columns by millions of rows
- Adjust row height and column widths
- Format cells and empty columns
- Add row titles
- Longer text strings and variable names
- Data linked to Exploratory graphs
- Multiple "undo" feature
- Handles missing data
- Edit column titles interactively
- Promote text labels to column titles
- Transpose rows/columns
- Sort, rank, index and stack data

## IMPORT/EXPORT DATA

- Microsoft Access .mdb
- SPSS .sav
- Microsoft Excel, Lotus® 1-2-3®, text files (.txt, .csv), dBase®, Quattro®, Symphony®, DIF and other versions of SigmaPlot, SigmaScan® Pro and SigmaStat
- Import any ODBC compliant database
- Run SQL queries on tables and selectively import information

## STATISTICS

### Analysis of Variance
- One sample t-test
- Independent and paired t-tests
- One-, two- and three-way ANOVA
- One- and two-way repeated measures ANOVA
- One-way ANCOVA with multiple covariates

### Nonparametric Statistics
- One-sample signed-rank test
- Mann-Whitney rank sum test
- Wilcoxon signed-rank test
- Kruskal-Wallis ANOVA
- Friedman repeated measures ANOVA

### Correlation
- Spearman rank-order
- Pearson product-moment

### Regression
- Linear and multiple linear
- Polynomial, specific order or model comparisons for many orders
- Stepwise, forward and backward
- Best subsets
- Multiple logistic
- Deming
- Nonlinear

### Principal Components
- Covariance or correlation matrix analysis
- Multiple methods of component selection

### Rates and Proportions
- Chi-square analysis of contingency tables
- McNemar test
- Fisher's exact test
- Z-test
- Odds Ratio and Relative Risk

### Power and Sample Size
- t tests and proportions
- ANOVA and correlation
- Chi-square

### Descriptive Statistics
- Mean, median, standard deviation, standard error of mean
- Percentiles, sum of squares
- Skewness, kurtosis
- Confidence interval for the mean range
- Maximum and minimum values
- Normality, sample size and missing value content

### Normality
- Kolmogorov-Smirnov
- Shapiro-Wilk

### Equal Variance
- Levene median test for ANOVA
- Spearman-rank correlation test for regression

### ANOVA Multiple Comparison Options
- Holm-Sidak test
- Tukey test
- Duncan's multiple range test
- Fisher's least significant difference test
- Student-Newman-Keuls test
- Bonferroni t test
- Dunnett's test
- Dunn's test

### Survival Analysis
- Kaplan-Meier product-limit estimation method
- Survival curve options: error bars, confidence intervals, censored or failure points, fraction or percentage scale
- Single group
- LogRank
- Gehan-Breslow
- Cox regression, proportional hazards and stratified models

### Regression Diagnostics
- Multicollinearity, homoscedasticity, residual analysis
- Cook's distance. Leverages, covariance matrices (and more)

### Test-Specific Options
- Set alpha for power calculation
- Set significance level for omnibus test and multiple comparisons
- Execution options (and more)

## MATHEMATICAL TRANSFORMS

- Parameter estimation functions for nonlinear regression
- Analytic functions, statistical functions, data manipulation
- Probability distribution functions, functions to solve equations
- Use single-value, column range, or worksheet blocks for input
- Random number generators
- Dummy variables to supplement ANOVA analysis
- User-defined (and more)

## REPORTS

- Export in PDF and HTML
- Multiple "undo" feature
- Print preview
- Cut and paste graphs
- Save to text files
- Option to "Explain Test Results"
- Display assumptions, ANOVA tables, summary tables, power, confidence intervals and multiple comparisons

## GRAPH CHOICES

### Exploratory Graphs
- Step plots
- Scatterplots
- Column means with error bars
- Raw and standardized residuals
- Bar charts with error bars
- Box plots and histograms
- Point plots and column means
- Pie charts
- Multiple-line plots
- 3D scatter and mesh plots

### Test Result Graphs
- Raw residuals (scatterplot)
- Standardized residuals (bar chart)
- Column means (bar charts and scatterplots)
- Bar charts with error bars
- ANOVA profile plots for main effects and interactions
- Adjusted means scatter with error bars
- Regression lines and scatter plots for groups
- Regression curves with confidence and prediction bands
- Survival curves, adjusted survival curves, cumulative hazard curves, log-log survival

### Test Results Graphs (cont'd)
- Point plots
- Point and column means
- Histogram of residuals
- Normal probability plot
- Scatterplot with regression and confidence intervals
- Box plots
- 3-D residuals and 3-D scatterplots
- Grouped bar charts
- Before-and-after plots
- Multiple comparison matrix
- Scatter correlation matrix
- Scree plot, component loadings plot, component scores plot

## GRAPH FEATURES

- Plot a range of rows
- Multiple "undo" feature
- Eight axis scaling options, including linear, log, probability, date/time
- Create axis titles and legends automatically
- Choose text fonts and control size and style
- Change type, color and fill of lines, and fill style
- Modify computation of error bars
- Add Gradient fills, antialiasing, color transparency
- Use the Histogram Wizard to plot histograms with options for styles
- Use the Plot Equation interface to create 2D and 3D graphs of functions and solve equations

## GRAPH EXPORT

- Exported formats include JPEG, GIF, PNG, BMP, TIFF-CMYK, TIFF-RGB, SVG, EPS, PDF vector, WMF, EMF
- Save graph as web page

## MICROSOFT WINDOWS INTERFACE / FILE MANAGEMENT

- Compatible with the Windows XP, 7, 8x, and 10 operating systems
- Support for importing graphics or data from Microsoft Office and other applications
- Ability to save and access multiple worksheets, reports, graphs and Excel files in a compound document

## SYSTEM REQUIREMENTS

- Windows XP, 7, 8.x, or 10
- 2GHz Processor 32-bit, 64-bit
- 2GB or more of RAM
- 200MB of disk space
- CD-ROM Drive
- SVGA/256 color graphics adapter (800 x 600, High Color recommended)
- To use HTML Help, Internet Explorer 8 or later required

**Learn more about SigmaStat and other Systat products -** contact your nearest Grafiti office or visit us at **www.grafiti.com**

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