Review ofAdvanced Excel for Scientific Data Analysis, 3rd Edition Advanced Excel for Scientific Data Analysis , 3 rd edition by Robertde Levie. Atlantic Academic LLC : Brunswick, M...

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Review of *Advanced Excel for Scientific Data Analysis*, 3rd Edition

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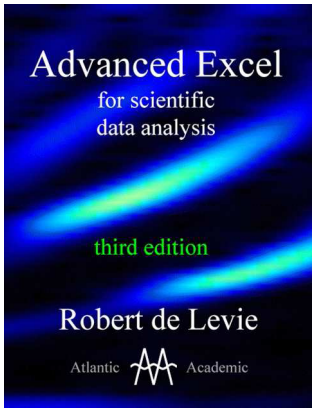
Advanced Excel for Scientific Data Analysis, 3rd edition by Robert de Levie. Atlantic Academic LLC: Brunswick, Maine, 2012. 646 pp. ISBN: 978-0-98-471230-4 (paperback). $79.50.

A spreadsheet application is commonplace software for data handling and graphing in K−16 classrooms. It has become an interesting instructional tool in higher education;[1] but what about its power in terms of computation, especially when combined with visual basics for applications (VBA)?

In the third edition of de Levie's *Advanced Excel for Scientific Data Analysis*, readers will see the immense computational power of Excel to address a large variety of scientific data analyses for the experienced Excel user. To accomplish this, readers will need to go to de Levie's Excellaneous Web site to download the wealth of macros that extend the computational power of Excel.[2] This third edition includes an expansion of visualization capabilities using Mapper and enhanced 3D graphics and a vast expansion of the ability to do matrix algebra using the provided macros. The macro collection also provides the capacity to enhance the precision of calculations updated for the versions of Excel 2007/2010. This book and accompanying macros allow the user to bring Excel up to a fairly high-powered computational engine all at no extra cost above the original purchase of Excel (and the cost of the book). Mac lovers may rejoice as VBA is back in Excel 2011. Because students have seen Excel in K−12, they will have a high degree of comfort when it appears in undergraduate education; and they have it on their laptop!



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All of the computational methods are introduced to the reader via worked examples from the literature. Fortunately, the book's author is a chemist and all the data used in the examples are available on his Web site.[2] The approach used is to "learn by doing" as you work the exercises. For students, the calculations are right in front of them on the spreadsheet to see! In Excel 2007/2010, the number of rows and columns available increased considerably. The SolverAid macro will address uncertainty to help assess Solver results, and if you want something even better than the version of Solver in Excel, you can try the Levenberg−Marquardt algorithm macro. Solver has been updated by Frontline Systems[3] in Excel 2010 as well. If you are doing systems modeling (time-dependent models), you can enhance your accuracy from Euler to fourth-order Runge−Kutta calculations (RK4) with a custom function macro. The macros are well documented and have pop-up windows to help guide their calculations and placement of results. Readers will quickly see how the computational power of Excel is augmented by the use of VBA.

The real expansion of capabilities addressed by de Levie is the addition of macros for matrix algebra (the Matrix.xla and BigMatrix.xla downloads). These two files provide considerable expansion of matrix operations. With the increased numerical precision and expansion of the number of rows and columns, solving systems of equations for larger complex problems can now be done in Excel. The XN macros, besides increasing the numerical precision, include a host of items to solve ordinary differential equations. Many of the macros are from the Web sites of Leonardo Volpi[4] and John Beyers.[5] As you peruse the possibilities, you may find yourself having a MATLAB déjà vu moment. When you download these files, be sure to read the accompanying text files that give the loading instructions. Like any good analytical chemist, de Levie has validated the computational power of several of these macros using NIST data.

So why use a spreadsheet? If you are on a shoestring budget, Excel is a good start for students and instructors. It places the calculations right in front of the students with good visual presentation (i.e., the graphics). With the added VBA tools, you can enhance the computational capabilities and then decide whether you want students to get into the aspects of VBA programming.

For the experienced Excel user, this reviewer recommends a copy of *Advanced Excel for Scientific Data Analysis* on your bookshelf. The next time you need to solve a complicated problem, pull it off the shelf, as it is a valuable resource for expanding the computational power of Excel.

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