



# Applied Mathematical Methods for Chemical Engineers, Second Edition

*Norman W. Loney*

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# Applied Mathematical Methods for Chemical Engineers, Second Edition

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**Applied Mathematical Methods for Chemical Engineers, Second Edition** Norman W. Loney

Focusing on the application of mathematics to chemical engineering, **Applied Mathematical Methods for Chemical Engineers, Second Edition** addresses the setup and verification of mathematical models using experimental or other independently derived data.

An expanded and updated version of its well-respected predecessor, this book uses worked examples to illustrate several mathematical methods that are essential in successfully solving process engineering problems. The book first provides an introduction to differential equations that are common to chemical engineering, followed by examples of first-order and linear second-order ordinary differential equations (ODEs). Later chapters examine Sturm–Liouville problems, Fourier series, integrals, linear partial differential equations (PDEs), and regular perturbation. The author also focuses on examples of PDE applications as they relate to the various conservation laws practiced in chemical engineering. The book concludes with discussions of dimensional analysis and the scaling of boundary value problems and presents selected numerical methods and available software packages.

## New to the Second Edition

- Two popular approaches to model development: shell balance and conservation law balance
- One-dimensional rod model and a planar model of heat conduction in one direction
- Systems of first-order ODEs
- Numerical method of lines, using MATLAB® and *Mathematica* where appropriate

This invaluable resource provides a crucial introduction to mathematical methods for engineering and helps in choosing a suitable software package for computer-based algebraic applications.

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