

Modeling of Polymeric Systems
Undergraduate 3 credit course in Polymer Engineering curriculum
Amirkabir University of Technology

Prerequisite: Mass transfer

Syllabus:

1. Formulation of processes: theoretical, empirical, semi empirical and analogy methods, conservation laws, governing equations
2. Numerical solution of nonlinear algebraic equations resulted of polymeric systems
3. Review of matrices and determinants
4. Curve fitting: finite differences, interpolation,
5. Numerical solution of ordinary differential equation: initial value problems (IVP), single step methods, multiple steps methods, boundary value problems (BVP)
6. Review of analytical solution of ordinary differential equations
7. Analytical solution of partial differential equations: separation of variables
8. Numerical solution of partial differential equation

References:

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4. V. G. Jenson and G. V. Jeffreys, "Mathematical Methods in Chemical Engineering", Academic press, 1977
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6. R. G. E. Franks, "Modeling and Simulation in Chemical Engineering", Wiely Inc., 1972
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8. S. M. Walas, "Modeling with Differential Equations in Chemical Engineering", Butterworth-Heinemann Inc. 1991
9. E. Kreyszig, "Advanced Engineering Mathemathics", Wiley Inc., 4th edition, 1979
10. M. R. Spiegel, "Mathematical Handbook of Formulas and Tables", Schum's Outline Series, McGraw Hill Co., 1968

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12. D. G. Baird and D. I. Collias, "Polymer Processing", Butterworth-Heinemann Inc., 1995
13. O. T. Hanna and D. C. Sandall, "Computational Methods in Chemical Engineering", Prentice Hall PTR, 1995
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16. D. Hanselman and B. Littlefield, "Mastering MATLAB", Prentice-Hall, 1995
17. W. J. Palm III, "MATLAB for Engineering Applications", McGraw-Hill Co., 1999
18. Constatinidis, and N. Mostofi, "Numerical Method for Chemical Engineers with MATLAB Applications", Prentice Hall., 1999