

Module 2: Learning objectives

- The primary purpose of this module is to improve your understanding of the conduction rate equation (Fourier's law) and to familiarize you with the heat diffusion equation. You should know the origin and implication of Fourier's law, and you should understand the key thermal properties and how they vary for different substances. You should also know the physical meaning of each term appearing in the heat equation.
- The student should understand to what form does the heat equation reduce for simplified conditions, and what kinds of boundary conditions may be used for its solution?
- The student should learn to evaluate the heat flow through a 1-D, SS system with no heat sources for rectangular and cylindrical geometries. Many other geometries exist in nature or in common engineering designs. The student, using a similar development, should be able to formulate an appropriate equation to describe systems of arbitrary, simple geometry.
- The student should be comfortable with the use of equivalent thermal circuits and with the expressions for the conduction resistances that pertain to each of the three common geometric.
- Composite thermal resistances for 1-D, Steady state heat transfer with no heat sources placed in parallel or in series may be evaluated in a manner similar to electrical resistances placed in parallel or in series.
- The student should learn to evaluate the heat flow through a 1-D, SS system with no heat sources for rectangular and cylindrical geometries.
- In short, by the end of the module, the student should have a fundamental understanding of conduction heat transfer and its mathematical description.