# ME 515: Advanced Problems in Heat Conduction Spring 2013 Course Syllabus

### 1. Fundamentals

- 1.1. Derivation of the heat equation.
- 1.2. Temperature as a potential.
- 2. One-dimensional problems.
  - 2.1 Infinite and finite media situations.

### 3. Separation of variables.

- 3.1. Product solutions of two and three-dimensional problems.
- 3.2. Problems with heat generation.
- 3.3. Eigenfunction expansions in the rectangular coordinate system.

## 4. Problems in cylindrical geometry.

- 4.1. Fourier-Bessel series for temperature distributions.
- 4.2. Non-homogeneous problems.
- 4.3. Product solutions.

## 5. Heat conduction in regions bounded by spheres.

- 5.1. Legendre and spherical Bessel function series for temperature distributions.
- 5.2. Three-dimensional unsteady problems for spheres and hemispheres.

### 6. Laplace transform methods.

6.1. Application in the case of non-orthogonal series and composite media problems.6.2. Inversion by the residue theorem.

## 7. Integral transform techniques.

7.1. Fourier, Hankel and Mellin transforms.

## 8. Special topics:

- 8.1 Anisotropic media.
- 8.2 Thermal contact resistance.
- 8.3 Composite media.
- 8.4 Porous media

## Textbook

Textbook Title:	Heat Conduction (3rd Edition)
Author:	M.N. Ozisik
Publisher:	Wiley Interscience

#### Prerequisite: AME 526, a must