ME 515: Advanced Problems in Heat Conduction
Spring 2016
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/Cengage

Prerequisite: AME 526, a must

Grading Scheme:	Homework:	20%
	Mid-Term Examination:	25%
	Final Project:	15%
	Final Examination:	40%

- ***Final grade will depend entirely on the performance on the above components, and be independent of the financial support requirements (e.g., minimum grade requirement for tuition reimbursement).***
- ***Please schedule your work-related travel during time periods outside of the mid-term and final exams. Accommodation to take exams on different dates will be made for only family emergencies and documented illness or health-related emergencies. Other exceptions will be considered on a case-by-case basis.***