

**PHYS 209 MATHEMATICAL METHODS IN PHYSICS I**  
**Fall 2012**

**Instructor:**

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**Course Web Page:**

<http://www.metu.edu.tr/~kseckin/PHYS209.html>

**Schedule:**

Monday: 13:40-15:30 P5  
Wednesday: 12:40-14:30 P3

**Recitations:**

Fri: 10:40-12:30 U1, Teaching Assistant will be announced later.

**Textbook:**

W. E. Boyce and R.C. DiPrima, *Elementary Differential Equations and Boundary Value Problems*, 9<sup>th</sup> Edition, Wiley 2010

**Suggested Books:**

F. B. Hildebrand, *Advanced Calculus for Applications*, 2<sup>nd</sup> Edition, Prentice-Hall 1976

S. L. Ross, *Differential Equations*, 3<sup>rd</sup> Edition, Wiley 1984

**Grading:**

There will be three midterm examinations and a final. Your midterm average will comprise 50% each of the best two and 10% of the lowest of your midterm examinations. If your midterm average is greater than your final, the midterm average and the final will contribute 60% and 40 %, respectively, to your final grade; otherwise the midterm average and the final will contribute 50% each to your final grade.

**Exam Dates and Places:**

1<sup>st</sup> Midterm Exam: 31 October 2012 Wednesday, Time: 17:40, Place: P1 and P2  
2<sup>nd</sup> Midterm Exam: 28 November 2012 Wednesday, Time: 17:40, Place: P1 and P2  
3<sup>rd</sup> Midterm Exam: 2 January 2013, Wednesday, Time: 17:40, Place: P1 and P2  
Final Exam: **To be announced later.**

**Course Content:**

- Definition and classification of differential equations
- First order differential equations
  - Linear equations, separable equations, homogeneous equations, Bernoulli equations, exact equations and integrating factors. Applications of first order equations.
- Second and higher order linear differential equations
  - Equations reducible to first order. Homogeneous equations with constant coefficients. Reduction of order. Cauchy-Euler equations. Non-homogeneous equations: Method of undetermined coefficients and method of variation of parameters.
- Series solutions of linear differential equations
  - Series solutions about ordinary points. Series solutions about regular singular points: Frobenius method.
- Systems of linear differential equations
- Boundary value problems and Sturm-Liouville Theory
- Fourier series and Fourier transforms