Course Introduction

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- Course Code: PHM 212s
- Course Name: Complex, Special functions and Numerical Analysis
- Instructors: Dr. Makram Roshdy Eskaros. “makram_eskaros@eng.asu.edu.eg”
- Textbook:

  “Advanced Engineering Mathematics", Erwin Kreyszig 10th edition. (2011), Wiley Int. Edition.
- Contents:
  - Special functions (The Gamma and Beta functions)
  - Series solutions for ordinary differential equations
  - Bessel functions

- **Legendre's polynomials**
- **Functions of the complex variable**
- **Numerical solutions for ordinary differential equations**
- **Numerical solutions for partial differential equations**

- **Grading Policy**

The grade you receive will be based on your performance on the quizzes, midterm, attendance, participation, reports/weekly assignments and final exam according to the following table:

Final Exam, according to faculty calendar.	**60%**
Unannounced Quizzes (Two Quizzes).	**10%**
Assignments and Reports.	**10%**
One Midterm (According to faculty calendar).	**20%**

- <u>**Assignments Grading**</u>

Students are requested to submit the assignments in time, late submission up to one week leads to grading your assignment 75% from its grade, further late will lead to 50% grading.

<u>Assignment No. 1</u>
<u>Gamma and Beta Functions</u>

1) **Prove that** $L\left\{t^{n}\right\} = \dfrac{\Gamma(n+1)}{s^{n+1}}$ **for any real number** $n > -1$. **Hence, find Laplace transform for each of the following functions:**

i) $t^{5/2}$ ii) $t^{-1/3}$ $\sqrt{t}\; e^{-3t}$

2) **Given that n is a positive integer and x is a real number, show that**

$$\beta(x, n) = \frac{(n-1)!}{x(x+1)(x+2)\ldots(x+n-1)}$$

Hence, evaluate $\beta(0.1, 3)$

3) **With and without using Legendre duplication formul...**

$$\Gamma(n+\frac{1}{2}) = \frac{(2n)!}{\ldots}\sqrt{\pi}$$