King Fahd University of Petroleum and Minerals
Department of Mathematics & Statistics
Syllabus Math 605
Semester II, 2014-2015 (142)

Instructor: Bilal Chanane
Office: 5-431, e-mail: chanane@kfupm.edu.sa

Course: Math 605: Asymptotic Expansions and Perturbation Theory
Text Book: C. Bender and S. Orszag, Advanced Mathematical Methods for Scientists and Engineers: Asymptotic Methods and Perturbation Theory, Springer 1999
Course Description: Asymptotic sequences and series. Asymptotic expansions of integrals. Solution of differential equations at regular and irregular singular points. Nonlinear differential equations. Perturbation methods. Regular and singular perturbations. Matched asymptotic expansions and boundary layer theory. Multiple scales. WKB theory.

Prerequisites: Math 430 ; Math 301 or Math 513

Week	**Date**	**Section**	Topic
1	Jan. 25-29	3.4	Introduction to Asymptotic, definition of O and o
2	Feb. 01-05	3.5	Asymptotic sequences, Asymptotic power series
3	Feb. 08-12	6.1-6.3	Asymptotic expansion of Integrals
4	Feb. 15-19	6.4	Laplace's method and Watson's lemma
5	Feb. 22-26	6.5-6.6	Method of stationary phase, method of steepest descents
6	Mar. 01-05	6.7	Asymptotic evaluation of sums
7	Mar. 08-12	3.1-3.3	Solution of differential equations (DE) at regular and irregular singular points
8	Mar. 15-19	3.4-3.5	Asymptotic expansions for DE
Midterm Vacation: March 22-26, 2015			
9	Mar. 29-Apr 02	7.1	Perturbation series
10	Apr. 05-09	7.2	Regular and singular perturbation theory
11	Apr. 12-16	7.4	Asymptotic matching
12	Apr. 19-23	8.1-8.2	Summation of series
13	Apr. 26-30	9	Boundary layer theory
14	May 03-07	10	WKB method
15	May 10-14	11	Multiple Scale Analysis
Final Exam : Monday May 25, 2015: 7:00pm			

Exams and Distribution of Marks:

- Midterm Exam I (25%) Tuesday March 31, 2015
- Final Exam (35%) (Comprehensive):
- Projects (20%)
- Homework (20%)

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