



Course Syllabus: Contemporary Topics in PDE - AMCS 394B

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	AMCS 394B
Course Title	Contemporary Topics in PDE
Academic Semester	Fall
Academic Year	2018/2019
Semester Start Date	08/26/2018
Semester End Date	12/11/2018
Class Schedule (Days & Time)	01:00 PM - 02:30 PM Mon Thu

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Peter A. Markowich	Peter.Markowich@kaust.edu.sa	+966128084864		by email appointment

Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	variational calculus, lagrangian functions and functionals, Euler-Lagrange equations, coercivity and lower semicontinuity, lower semicontinuity by convexity, weak convergence of determinants of derivative matrices, polyconvexity, mountain pass lemma
Course Description from Program Guide	
Goals and Objectives	understanding of the basics of variational calculus
Required Knowledge	sound knowledge of real analysis, ordinary and partial differential equations
Reference Texts	Lawrence Craig Evans: Partial Differential Equations
Method of evaluation	100.00% - Oral presentation
Nature of the assignments	oral presentations
Course Policies	to be discussed in class
Additional Information	

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Mon 08/27/2018 Thu 08/30/2018	variational calculus
2	Mon 09/03/2018 Thu 09/06/2018	Euler-Lagrange equations
3	Mon 09/10/2018 Thu 09/13/2018	Euler-Lagrange equations
4	Mon 09/17/2018 Thu 09/20/2018	coercivity
5	Mon 09/24/2018 Thu 09/27/2018	lower semicontinuity
6	Mon 10/01/2018 Thu 10/04/2018	convexity
7	Mon 10/08/2018 Thu 10/11/2018	lower semicontinuity by convexity
8	Mon 10/15/2018 Thu 10/18/2018	existence of minimizers of Lagrangian functionals
9	Mon 10/22/2018 Thu 10/25/2018	uniqueness of minimizers, uniform convexity
10	Mon 10/29/2018 Thu 11/01/2018	weak convergence of determinants of derivative matrices
11	Mon 11/05/2018 Thu 11/08/2018	polyconvexity
12	Mon 11/12/2018 Thu 11/15/2018	polyconvex functionals in elasticity
13	Mon 11/19/2018 Thu 11/22/2018	local minima of Lagrangian functionals
14	Mon 11/26/2018 Thu 11/29/2018	mountain pass lemma
15	Mon 12/03/2018 Thu 12/06/2018	existence of critical points, examples from elliptic theory
16	Mon 12/10/2018	wrap-up
17		
18		

Note

The instructor reserves the right to make changes to this syllabus as necessary.