

PROGRAMA DE CURSO

Código	Nombre			
MA6981	Seminario Avanzado de Matemáticas I Desigualdades Funcionales Óptimas			
Nombre en Inglés				
Optimal Functional Inequalities: Part of Prefalc Project Paris-Dauphine/DIM-CMM U. Chile				
SCT	Unidades Docentes	Horas de Cátedra	Horas Docencia Auxiliar	Horas de Trabajo Personal
6	10	5		5
Requisitos			Carácter del Curso	
MA3802 Teoría de la Medida (Measure Theory)/ MA4802 Ecuaciones en Derivadas Parciales (PDEs).			Electivo de Carrera/Magister/Doctorado	
Resultados de Aprendizaje				
<p>The student understands advanced topics in the study of functional analytic inequalities, taught by world experts in the area.</p> <p>A mixed PDE/Probabilistic understanding of the topic is useful to obtain new results in a research area in the edge of mathematical knowledge</p>				

Metodología Docente	Evaluación General
<ul style="list-style-type: none"> Clases expositivas 	<ul style="list-style-type: none"> 2 Tareas

Unidades Temáticas

Número	Nombre de la Unidad	Duración en Semanas
1	Introduction (Español) (Prof. Joaquín Fontbona, aprox. 7-11 Agosto 2017)	1
Contenidos	Resultados de Aprendizajes de la Unidad	Referencias a la Bibliografía
Introduction to Optimal Functional Inequalities, Probabilistic methods.	El alumno se prepara para los cursos avanzados siguientes. Repaso de los tópicos probabilísticos y de EDPs necesarios.	1-2

Número	Nombre de la Unidad	Duración en Semanas
2	Logarithmic Sobolev Inequalities Essentials: Probabilistic Side. (English.) Lecturer: Prof. Djalil Chafaï (Ceremade, U. Paris-Dauphine), September 25th until October 6th approx.	2
Contenidos	Resultados de Aprendizajes de la Unidad	Referencias a la Bibliografía
Summary: 1 Introduction 2 Hypercontractivity 3 Concentration of measure 4 Tensorization and Central Limit Theorem 5 Bakry-Émery criterion.	The student understands advanced probabilistic methods in the study of functional inequalities	1

Número	Nombre de la Unidad	Duración en Semanas
3	<p>Nonlinear flows and optimal functional inequalities</p> <p>Lecturer: Prof. Jean Dolbeault (Ceremade, U. Paris-Dauphine), October 9/19 approx.</p>	2
Contenidos		Resultados de Aprendizajes de la Unidad
<p>1. A summary of known results on ϕ-entropies and related functional inequalities based on simple linear diffusion equations, including results based on the Bakry-Emery method.</p> <p>2. Interpolation inequalities on compact manifolds, with the sphere as main example, with an emphasis on the use of the fast diffusion flow in order to cover the whole range of parameters up to the critical exponent.</p> <p>3. Rényi entropy powers compared to relative entropy methods on the Euclidean space as a new tool for capturing optimal constants in the large time regime, with applications to Gagliardo-Nirenberg inequalities.</p> <p>4. Considerations on branches of solutions and bifurcations in semilinear elliptic equations: known rigidity results can be reinterpreted as stationary points of flows based on nonlinear diffusions.</p> <p>5. Symmetry and symmetry breaking results in Caffarelli-Kohn-Nirenberg inequalities: how to introduce nonlinear flows in presence of weights for proving symmetry results,</p> <p>6. (If time permits) Further considerations on large time asymptotics, linearization and optimal constants.</p>		<p>The student understands advanced PDE methods in the study of functional inequalities</p> <p>(Important: Partly joint with MA5603 Análisis no Lineal by profs. Manuel del Pino and Juan Dávila.)</p>
		2

Bibliografía General

[1] Curso Prof. Chafai: Lecture notes:

<http://djalil.chafai.net/docs/M2/chafai-lehec-m2-lsie-lecture-notes.pdf>

Chapters 1-5.

[2] Curso Prof. Dolbeault: Lecture notes:

<https://www.ceremade.dauphine.fr/~dolbeaul/Courses/UAM-2017/LectureNotes.pdf>

login: UAM , password: UAM

Vigencia desde:	Primavera 2017
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