



DEPARTAMENTO DE
GEOMETRÍA Y TOPOLOGÍA



GOBIERNO
DE ESPAÑA

MINISTERIO
DE CIENCIA
E INNOVACIÓN



Instituto de
Matemática
Interdisciplinar

Sistemas dinámicos y geometría: tres aproximaciones

Periodo de concentración 2009-2010

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“Global theory of holomorphic foliations”

The global study of holomorphic foliations is a quite recent subject, but with a venerable pre-history going back to the works on algebraic differential equations by Clebsch, Jacobi, Darboux, Poincaré, Painlevé, and others. It is a rich subject lying at the crossroad of complex algebraic geometry, differential geometry, dynamics and topology. The theory has many natural open questions and has found recently applications beyond its own boundaries.

The course pretends to be an introduction to some of the aspects of the theory with emphasis on the algebraic-geometric approach. It will be built on Jouanolou's classical monograph “Équation de Pfaff Algébriques”. The idea is to present the results there contained together with the most up-to-date proofs and discuss subsequent developments and applications.

Tentative program

- (1) Invariant hypersurfaces and first integrals
 - (a) Many invariant hypersurfaces implies first integral.
 - (b) Boundness of curves on surfaces of general type.
 - (c) Topology of divisors.
- (2) Singularities
 - (a) Singular set of generic Pfaff equations.
 - (b) Bott's vanishing Theorem.
 - (c) Dimension of the singular set of holomorphic foliations.
 - (d) Kupka singularities.
- (3) Invariant algebraic sets
 - (a) Bounds for the degree.
 - (b) Obstructions to compactness (index theorems).
 - (c) Poincaré Problem.
- (4) Foliations without algebraic solutions
 - (a) Jouanolou's examples and Theorem.
 - (b) Generalizations of Jouanolou's Theorem.
- (5) Irreducible components of the space of foliations on projective spaces.
 - (a) Gauss map and classification in degree zero and one.
 - (b) Tangent space computation.
 - (c) Foliations with rational first integral.
 - (d) Foliations with split tangent sheaf.

Organizado por el Departamento de Geometría y Topología, los Grupos de Investigación UCM “Geometría de las variedades proyectivas”, “Análisis funcional no-lineal en espacios Banach” y “Teoría de la forma y la dinámica topológica”; el Proyecto i-math, el Proyecto MTM2007-61124 y el IMI

Entre el 18 y el 28 de enero de 2010.

Lunes, miércoles y jueves de 15.30 a 17.30

Seminario 225, Facultad de Ciencias Matemáticas, UCM