MATH 8230 (SYMPLECTIC GEOMETRY) SPRING 2015 SYLLABUS

Instructor: Mike Usher

Scheduled class meetings: MWF 9:05-9:55 in Boyd 410.

Office hours: after class, or by appointment, in Boyd 447.

Textbook: *Lectures on Symplectic Geometry*, by Ana Cannas da Silva. Springer LNM 1764, 2008, ISBN 3540421955.
The first part of the course will not use this book; I will post lecture notes to my webpage.

Subject matter: The course is intended as a gentle introduction to symplectic geometry, approached by starting with the study of area-preserving maps of $\mathbb{R}^2$ and of surfaces equipped with an area form. In the process we will develop the theory of differential forms in a motivated way which I hope will be useful to students in differential geometry/topology in general. After studying the two-dimensional case in detail, we'll proceed to general symplectic manifolds following Cannas' book, including discussions of symplectic linear algebra, the cotangent bundle, Darboux's theorem, Lagrangian submanifolds and tubular neighborhood theorems, Hamiltonian mechanics, Hamiltonian group actions and moment maps, and possibly additional topics depending on time and student interest.

Grading: Grades will be based on homeworks, which will likely be given every couple of weeks.

Prerequisites: Basic familiarity with smooth manifolds; for instance you should know what the tangent space to a smooth manifold is and how the derivative at a point of a smooth map between manifolds is naturally viewed as a linear map between tangent spaces, and you should be comfortable with arguments involving partitions of unity. I will not assume background with differential forms.

Academic honesty: As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in "A Culture of Honesty" found at: www.uga.edu/honesty. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Obligatory disclaimer: The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.