Fractal Geometry, Fall 2016

Description and Goals

Fractal geometry provides a relatively new way of mathematically modelling natural phenomena, and also a way of generating some spectacular art! This course will provide the mathematical framework for generating and analyzing fractals. We will focus attention on iteration function systems and Hausdorff dimension.

The course will begin with a discussion of some basic metric space concepts. We will then look at the Hausdorff metric on the collection of non-empty compact subsets of a metric space. This will provide the setting for the study of iteration function systems. Iteration function systems have had significant applications in image storage, transmission and reconstruction and provide a method for generating fractals. Finally, we will (after a discussion of some measure theory) discuss Hausdorff dimension and Hausdorff measure.

There will be a course in the spring semester, on Dynamical Systems and Chaos Theory. In that course we will see how fractals arise in the study of dynamical systems.

Here is a link for the Wikipedia article on fractals.

The course will meet Monday, Wednesday and Friday, Period 5, in Little 201. There will be two sections for the course:

MAT 4930: Section 2C28

MTG 5411: Section 18AB

Text: There will be no required text, but instead three references.

References

Gerald A. Edger, **Measure Topology, and Fractal Geometry**, Springer-Verlag, 1990. (An online version is available through the UF library.)

Michael Barnsley, **Fractals Everywhere**, Academic Press, 1988.

Kenneth Falconer, **Fractal Geometry** (second edition), Wiley, 2004.

Grades

Grades will be based on five problem sets and class participation. No exams will be given. There will be 200 possible points.

Grading Scale

A: 180-200   A-: 175-179   B+: 170-174   B: 160-169   B-: 155-159
C+: 150-154   C: 140-149   C-: 135-139   D+: 130-134   D: 120-129

■ Additional Information and Links:

Grades: Grading will be in accord with the UF policy stated at https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Honor Code: "UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class."

Class Attendance: "Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx."

Accommodations for Students with Disabilities: "Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester."

Online Evaluations: "Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/."

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.