Chaos and Dynamical Systems

MA-UY 4474A and MATH-UA 264

M & W, 11am – 12:15pm

Recitation: TBA

Warren Weaver Hall – Rm 201

Instructor: Professor David McLaughlin

Warren Weaver 1113

David.McLaughlin@nyu.edu

Office Hours – M &W 10am – 11am

Or by appointment

Topics

- **One dimensional flows —** Fixed point and stability, population growth, linear stability, existence and uniqueness, impossibility of oscillations.
- **Bifurcations —** Introduction. Saddle-node, transcritical, and Pitchfork bifurcation.
- **Two-dimensional flows —** Phase portraits, classification of linear systems, non-linear oscillations.
- **Regular dynamic behavior**
- **Samples of chaotic dynamical behavio**r

Textbook

- **Dynamics:** *Nonlinear Dynamics And Chaos: With Applications To Physics, Biology, Chemistry, And Engineering*, by Steve Strogatz **(required textbook)**

Organization and Grading

- Active participation in homework assignments is ***required for success in the course.*** Homework will be due at each recitation. Late assignments will not be accepted.
- Class and recitation attendance is ***strongly encouraged.*** Attending class makes it much

easier to do well in the course.

- **Grading:** The midterm Exam will count for 1/3 of the final course grade, and the Final Exam (which will be cumulative) will count for 2/3 – with a couple of caveats:
    - Those whose final examination letter grade is higher than their midterm exam letter grade will receive the final examination grade as the course grade.
    - Strong performance on homework will influence the final grade in two ways:
        - Examination questions will be very similar to homework problems, so understanding the homework problems will be good preparation for the examinations.
        - Students with a borderline (B+, for example) examination grade and with strong homework, will be "pushed up across the border" to the higher grade (A- in this example).