
Chaos and Fractals: Syllabus

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Day 1 (Mon) **Introduction**

- morning: welcome, Meet a new friend Bingo, Honor code, pre-assessment
- afternoon: movie (Colors of Infinity)
- evening: discussion, building large Sierpinski Triangle, reading

Day 2 (Tue) **Fractals I: geometric iteration**

- morning: Geometric iteration, Fractals generated by removals
- afternoon: Growing fractals
- evening: homework, reading

Day 3 (Wed) **Chaos I: numerical iteration**

- morning: Numerical iteration
- afternoon: Types of fixed points
- evening: discussion about projects

Day 4 (Thu) **Chaos II: graphical iteration**

- morning: graphical iteration, web graphs
- afternoon: logistic population growth model
- evening: hw

Day 5 (Fri) **Chaos III: nonlinear iteration**

- morning: nonlinear iteration, quadratic function, computer lab for projects
- afternoon: topic posters

(Sun)

evening: The Proof, movie and discussion

Day 6 (Mon) **Review I**

- morning: nonlinear iteration, last week's topics review
- afternoon: computer lab, playing with applets
- evening: HW/reading/working on projects

Day 7 (Tue) **Fractals II: self-similarity**

- morning: review test, self-similarity
- afternoon: multiple reduction copy machine
- evening: computer lab, working on projects

Day 8 (Wed) **Fractals III: from randomness to order**

- morning: random iteration and the chaos game
- afternoon: other chaos games
- evening: building 3D Sierpinski Tetrahedron, working on projects

Day 9 (Thu) **Fractals IV: fractal dimension**

- morning: fractal dimension
- afternoon: continued
- evening: inverse fractal dimension problem, preparing for midterm projects

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Day 10 (Fri) **Chaos IV: entering the realm**

- morning: chaos from non-linear iteration, sensitivity to initial conditions, the butterfly effect
- afternoon: project midterm reviews

(Sun)

- evening: movie (War Games)

Day 11 (Mon) **Review II**

- morning: review of last week's topics and projects
- afternoon: review test
- evening: seeing chaos, the play-doh game

Day 12 (Tue) **Chaos VI: advanced topics**

- morning: the orbit diagram
- afternoon: computer lab, chaos games, working on projects
- evening: working on projects/reading

Day 13 (Wed) **Fractals IV: advanced topics**

- morning: perimeters and areas
- afternoon: fractals in nature
- evening: movie An Inconvenient Truth, discussion

Day 14 (Thu) **Fractals V: Mandelbrot and Julia Sets**

- morning: post-assessment, SPEs, complex numbers
- afternoon: Mandelbrot and Julia Sets
- evening: computer lab, finishing projects

Day 15 (Fri) **Projects Presentation**

- morning: project presentations