**Syllabus for 2025 EESC W3400**, **Computational Earth Science**

William Menke, Instructor

Lec 01: Sept 2

Introduction and Goals of Course

Lec 02: Sept 4

Computing of simple formulas

Lec 03: Sept 9

Runge Kutta method illustrated by falling objects

Lec 04: Sept 11

Planetary Orbits

Lec 05: Sept 16

Reservoir models illustrated by cascade of lakes

Lec 06: Sept 18

Ultra-simplified global warming model

Lec 07: Sept 23

Seismic rays

Lec 08: Sept 25

Cooling of the solid Earth

Lec 09: Sept 30

Temperature of cooling conductive rod

Lec 10: Oct 2

Least squares estimation illustrated using global warming data

Lec 11: Oct 7

Periodicities and Fourier series

Lec 12: Oct 10

Fast Fourier Transform illustrated using environmental time series

Lec 13: Oct 14

Useful things that can be done using the Fast Fourier Transform

Lec 14: Oct 16

2D FFT illustrated by propagating waves

Lec 15: Oct 21

Gravity anomalies computed using the FFT

Lec 16: Oct 23

Natural textures created using the 2D FFT

Lec 17: Oct 28

Chemical diffusion computed with the 2D FFT

Lec 09: Sept 30

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Lec 17: Oct 28

Chemical diffusion computed with the 2D FFT Lec 18: Nov 6

Vibrations of 1D finite bodies

Lec 19: Nov 11

Vibrations of 2D finite bodies

Lec 20: Nov 13

Finite difference method illustrated with 2D time-independent conductive heat flow

Lec 21: Nov 18

2D time-independent heat flow in objects with complicated shape

Lec 22: Nov 20

Writing a FD code illustrated with 1D+time heat flow equation

Lec 23: Nov 25  
 FD method illustrated by channel flow with eddy

Lec 24: Dec 2

FD method illustrated by convection in box

Lec 25: Dec 5

Writing a least squares code illustrated with planar fit problem

Class Presentations: Dec 9 and (possibly) 11