**Natural Order Syllabus (Winter Quarter, 16 Credits)**

**Webpage:** http://academic.evergreen.edu/curricular/Natural-Order/
**Faculty**: David McAvity mcavityd@evrgreen.edu x5490 Lab 1, 1024

**Description**

The natural world is filled with a wonderful variety of forms and is shaped and transformed by complex interactions. Careful observation reveals that behind this complexity is an underlying order. The order manifests itself as spatial arrangements, such as spirals in shells, branching in rivers and hexagonal cells in beehives, and in temporal sequences, such as in patterns of growth, the interference of waves, and the motion of planets. In this program we will investigate the physical constraints and simple mathematical rules that make sense of this order. We will also explore the conditions under which this order is lost in the transition to chaos and randomness.

This program is introductory in nature and is well suited to students who want to investigate the mathematical and physical underpinnings of natural phenomena. Students of all backgrounds are welcome, but everyone should be prepared to spend a full quarter working with quantitative material in a spirit of curiosity and engaged inquiry. This program would serve as a good introduction and preparation for some of our foundation programs in mathematics and the sciences and for students interested in becoming teachers.

**Weekly Schedule**

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| Mon | 9:00-11:00 | Sem II E3109 | Lecture |
| | 1:00-3:00 | Sem II E2105 | Seminar |
| Tue | 9:00-12:00 | Lab 1 1050 | Physics Lab |
| | 1:00-4:00 | CAL West | Computer Lab |
| Wed | 9:00-12:00 | Sem II E2105 | Mathematics of Nature Lecture/Workshop |
| | 1:00-3:00 | Sem II E2105 | Optional Tutorial |
| Thur | 9:00-12:00 | Sem II E2105 | Conceptual Physics Lecture/Workshop |

**Program Texts:**
*Life's Other Secret,* Ian Stewart
*Deep Simplicity,* John Gribbin
*Arcadia,* Tom Stoppard
*Physics: Concepts and Connections,* Art Hobson

**Program Outline:**
Math: Number Patterns, Growth, Scaling, Spirals, Branching, Fractals and Tiling
Physics: Dynamics, Oscillations and Waves, Entropy, Chaos and Quantum Theory
Computer Modeling: Modeling with spreadsheets, Agent based modeling with Netlogo

**Supplies:**
Scientific calculator, ruler and compass set, colored pencils or pens, lab notebook