

## ASIM 2320 Nature & Code

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### Course Description:

This highly interdisciplinary course combines creative approaches from the arts, imaging and visualization techniques from computer science, and the study of patterns and processes in nature. Students collect natural data from the field, including physical specimen and samples; documentary data, including still, motion and aural capture; and recorded statistical data and measurements. The collected data forms the basis for algorithmically generated simulation studies, including artificial life models, examining herding, swarming and other dynamic group behavior; and morphological, growth and motility studies, including rendering virtual grass, trees, flowers, clouds, worms, insects, etc. This course combines fascinating ideas found in mathematics, computer science, the arts and the natural sciences, demonstrating the amazing interconnectivity and beauty of life.

### Course Texts:

*The Nature of Code: simulating Natural Systems with Processing*, by Dan shiffman  
*The Computational Beauty of Nature: Computer Explorations of Fractals, Chaos, Complex Systems, and Adaptation*, by Gary Flake, A Bradford Book

### ProcessingTexts:

*Processing: Creative Coding and Computational Art*, Ira Greenberg, 2007, foED  
*Processing: A Programming Handbook for Visual Designers and Artists*, Casey Reas, Ben Fry, 2007, MIT Press  
*Learning Processing*, Daniel Shiffman, 2008, Morgan Kaufmann  
*Visualizing Data*, Ben Fry, 2007, O'Reilly Press  
*Deitel & Deitel: Java How to Program: Late Objects Version, 8/E*, Pearson Prentice Hall

### Links:

Processing Related and Code Art

<http://processing.org>

<http://openprocessing.org>

<http://reas.com>

<http://benfry.com>

<http://www.shiffman.net>

<http://cs.nyu.edu/~perlin/>

<http://roberthodgin.com>

<http://infosthetics.com>

<http://www.smashingmagazine.com/2007/08/02/data-visualization-modern-approaches>

<http://toxi.co.uk>

<http://www.tobyjoe.com/2009/07/toward-the-bare-metal>

<http://horizon.wiki.nmc.org/2010+Data+Visualization>

<http://design.osu.edu/carlson/history/lesson9.html>

## Java

<http://download.oracle.com/javase/6/docs/api/>

<http://download.oracle.com/javase/tutorial/>

<http://www.java.com/en/>

<http://www.oracle.com/technetwork/topics/newtojava/overview/index.html>

<http://www.oracle.com/technetwork/java/javase/overview/index.html?ssSourceSiteId=ocomen>

<http://www.oracle.com/us/technologies/java/index.html>

<http://math.hws.edu/javanotes/>

### **Course Requirements:**

This course will include readings, programming assignments, presentations and critiques. The due date for all assigned materials will be announced in advance. It is the student's responsibility to have all assignments ready on time. Any student who has to be absent on an assignment due date must arrange to have the assignment submitted early. In addition, it is the student's responsibility to make up any missed work or locate lecture notes due to absence.

### **Method of Presentation:**

This course is NOT designed as a traditional "sage on the stage" lecture. Class time will be used to discuss concepts and project issues, work collaboratively and to ask questions. Students need to come to class prepared to use this time effectively. Being unprepared is equivalent to an absence.

### **Method of Evaluation:**

There will be programming assignments and project critiques. Attendance and proactive participation in class are expected. Points will be awarded as described below.

### **Total: 100 points**

Programming Assignments = 30%

Project Critiques = 45%

Class Discussion and Participation = 15%

Attendance = 10%

Final grades are determined as follows:

- \* 90 - 100 : A
- \* 87 - 89 : B+
- \* 80 - 86 : B
- \* 77 - 79 : C+
- \* 70 - 76 : C
- \* 67 - 69 : D+
- \* 60 - 66 : D
- \* 0 - 60 : F

### **Daily Lectures/Project Topics:**

- Graphics Programming and Creative Coding
- Pseudo Randomization, Seeding and Perlin Noise
- Euler & Verlet Motion
- Inverse Kinematics

- Physical Simulation
- Natural Simulation
- Imaging
- Growth, Herding and Swarming
- Cellular Automata and Complexity
- Lindenmeyr Systems
- Fractals and Chaos

### **Attendance Policy**

Students are expected to attend all class lectures. If a student is absent from class on the due date of any assignment, they are expected to make alternative arrangements to assure that the assignment is turned in on time.

### **Academic Honesty and Misconduct - The Honor Code**

All work undertaken and submitted in the course is governed by the University's Honor Code. The relevant section of the Code, taken from the Preamble of the Honor Council's Constitution: *Intellectual integrity and academic honesty are fundamental to the processes of learning and of evaluating academic performance, and maintaining them is the responsibility of all members of an educational institution. High personal standards of honesty and integrity are a goal of education in all the disciplines of the University. Students must share the responsibility for creating and maintaining an atmosphere of honesty and integrity. Students should be aware that personal experience in completing assigned work is essential to learning. Permitting others to prepare their work, using published or unpublished summaries as a substitute for studying required materials, or giving or receiving unauthorized assistance in the preparation of work to be submitted are directly contrary to the honest process of learning. Students who are aware that others in a course are cheating or otherwise acting dishonestly have the responsibility to inform the professor and/or bring an accusation to the Honor Council.* A violation of the Honor Code may result in an "F" for the course, and the student may be taken before the Honor Council. If you are unclear about this policy, either in general or in its specific application, please see the instructor. The Honor Code is in the SMU Student handbook and may be viewed on-line at : [http://smu.edu/studentlife/PCL\\_05\\_HC.asp](http://smu.edu/studentlife/PCL_05_HC.asp)

\* **Disability Accommodations:** Students needing academic accommodations for a disability must first contact Disability Accommodations & Success Strategies (DASS) at 214-768-1470 or [www.smu.edu/alec/dass.asp](http://www.smu.edu/alec/dass.asp) to verify the disability and to establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. [See University Policy No. 2.4; an attachment describes the DASS procedures and relocated office.]

\* **Religious Observance:** Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. [See University Policy No. 1.9.]

\* **Excused Absences for University Extracurricular Activities:** Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. [University Undergraduate Catalogue]