

**New Course: Math, Art, and Computing CGS 2032, Credits: 3 (Math Gen Ed)**  
**Prerequisite: Precalculus: Algebra and Trigonometry MAC 1147 or equivalent**  
**Instructor: Kristian Linn Damkjer, <http://www.cise.ufl.edu/~kdamkjer/>**

**Justification for Course:**

Introduces non-computer science and engineering undergraduates, especially those within the Fine Arts Digital Arts and Sciences program, to interdisciplinary computer science topics including logic, discrete structures, algorithms, and virtual automata along with several applications. The course will not be limited to FA-DAS students and can be taken by anyone with the appropriate background in mathematics. The interdisciplinary nature of this course stresses the interrelationship of the disciplines of mathematics and computing with nature and the fine arts.

**Catalog Course Description:**

Introduction to interdisciplinary computer science topics. Logic, discrete structures, algorithms, and automata. Exploration of topics relating mathematics and computing to art, music, and nature.

Prerequisites: Precalculus: Algebra and Trigonometry MAC 1147 or equivalent

**Mathematics general education credit to fulfill 3 credits of Gordon Rule Math.**

**Course Objectives:**

To introduce students to interdisciplinary computer science topics including logic, discrete structures, algorithms and automata. To introduce and explore relationships between computing and artistic disciplines as illustrated through art, music, electronic media, and nature.

**Course Content Overview:**

1. Regular multimedia-enhanced lectures in a CIRCA-equipped classroom
2. Peer critique and Socratic seminars to discuss relevant works
3. Multimedia demonstrations (VHS, DVD, Internet)

**Required Text:**

Jay Kappraff, "Connections: The Geometric Bridge Between Art and Science", World Scientific, 1991, ISBN 981-02-4586-6

**Required Software:**

The Processing Language and Environment, <http://www.processing.org/>

**Attendance Policy:**

Attendance is required and will be checked by the instructor.

## Makeup Policy:

In general there are no late submissions or make-ups permitted except in the following circumstances: religious holidays, student illness or medical impairment, absence subject to the twelve-day rule, examination conflicts, or legal impairment. In these circumstances the student should notify the instructor as soon as they are aware of a potential exam or deadline conflict so that an alternative may be established.

## Grading:

1. Attendance.....	5%
2. Critique/Seminar Participation.....	15%
3. Homework Projects.....	25%
4. Final Project.....	20%
5. Midterm Examination.....	15%
6. Final Examination.....	20%

## Lecture Topics:

1. Logic, Sets, and Functions. Case study: Recursion and self-similarity in music, art, and nature. Lindenmeyer Systems. Droste.
2. Sequences and Series. Case study: harmonic, and Fibonacci sequences
3. Numbers and Number Systems. Case study: Famous numbers  $\varphi$ ,  $\Phi$ ,  $\pi$ ,  $e$ ,  $i$
4. Coordinate Systems. Case study: Cartesian Coordinates, Complex Plane, Quaternion Space, and Julia sets. Mandelbrot.
5. Perspective. Case study: Use of multi-point perspective in fine and commercial art. Durer.
6. Algebraic Structures and Symmetry. Case study: Platonic and Archimedean solids/duals
7. Dimensionality. Case study: Projections and hyper-dimensional geometry
8. Non-Euclidean Geometry: Case-study: Hyperbolic tessellations. M. C. Escher
9. Automata. Case study: Game of Life. Conway