

Liberal Arts Colloquium: Geometry through(-out) the Arts  
Summer A 2010, IDS 4920-U02A (51653)

Generalities

This course is structured as a broad discussion of one aspect of that interest: the role Geometry has played in Architecture, and Visual Arts throughout the centuries starting from ancient Greeks, and ending up with the modern art. The notions of perspective in Visual Arts, and form in Architecture have stimulated the development of Geometry. On the other hand, the people have always tried to find a mathematics explanation for what they have considered beautiful. In the abstract purity and mystical magic of the numbers and geometric figures, many have found a basis for their philosophical understanding of the world. This course is about all that. Arts and Geometry in the course harmoniously complement each other helping understand better the role each of them plays in the development of the other. The ultimate purpose of the course is to help the Liberal Study majors see and appreciate the Geometric (and Mathematics) background in their areas of study.

Prerequisites.

This course is designed for students with little or no systematic knowledge of College Geometry and Arithmetic. Most of the material is accessible for students with elementary geometric intuition on Middle and High School level (points, lines, polygons, circles, straight edge, compass). Some general acquaintance with (Greek) Philosophy, Architecture, and Visual Arts could be beneficial, but is not necessary: the needed facts and concepts are introduced in the course of the lectures/seminar discussions.

Assessment of students' knowledge

The participants at the Colloquium will do projects on different aspects of the interrelation of Geometry and Visual Arts. A variety of possible projects will be offered during the course. The interested ones could do some elementary projects on pure Geometry and/or Arithmetic. The overall grade will be decided on the results of three projects.

Tentative syllabus

- 1) The Roman Era. The Ten Books of Architecture by Vitruvius, and the role of Geometry in it.
- 2) The theory of perspective, the projective space.  
Vanishing points and viewpoints.  
One, two and three point perspective.
- 3) The works of Albrecht Durer.
- 4) The mathematical background of the works of Leonardo.
- 5) The form in Architecture: from ancient time to the modern days.
- 6) The Inverse Perspective. Anamorphic Art.
- 7) About the gems in Mathematics: the magic of the golden ratio.  
Pythagoreans, Fibonacci numbers, The Beautiful.
- 8) The metaphysical aspect of the Plato's solids.  
Semi-regular solids of Archimedes.
- 9) Fractals in Nature and Arts.

Suggested literature

- 1) D. Pedoe, *Geometry and the Liberal Arts*
- 2) E. Burger, M. Starbird, *The Heart of Mathematics*
- 3) K. Clark, *Civilization: a personal view*
- 4) H. Janson, *History of Art* (two volumes)
- 5) M. Frantz and A. Crannell, *Viewpoints: Mathematical Perspective and Fractal Geometry in Art*

Remark: The Instructor has the right to make any academically appropriate changes in the syllabus.