

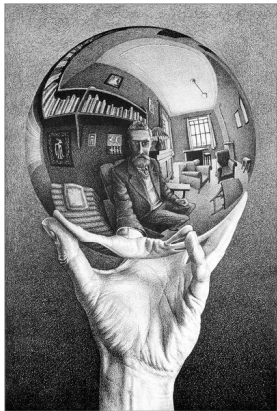
(More Than) Ten Years of Student Art

Bryan Clair

Department of Mathematics and Computer Science  
Saint Louis University  
bryan@slu.edu

August 6, 2015

# Math and the Art of M. C. Escher



M. C. Escher, 1935



*In Class, 2009*



*Michael O., 2002*

# Course Structure



*Alison A., Melinda K., Jennie Z., 2007*

Developed in 2000  
with Anneke Bart

- Mostly freshmen
- Technology use
- Limited class size
- Inquiry learning
- In class  
“explorations”
- Group work
- Field trips
- Art projects

# Mathematical Content



Marcy W., 2008

## Core topics

- Symmetry
- Tessellations
- Non-Euclidean Geometry
- Art and Illusion

## Course themes

- Classification
- Infinity
- Duality
- Perception

# Symmetry

- Isometries and similarities
- Symmetry groups



Haley R., 2009

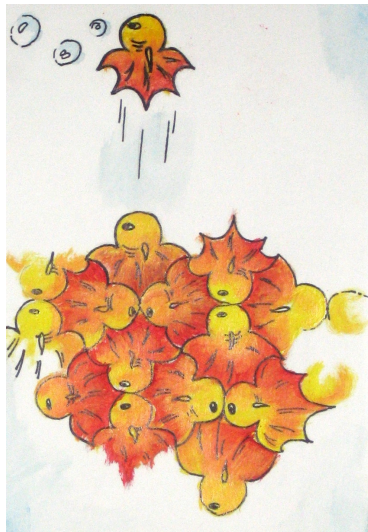
# Symmetry



Leah S., 2011

# Tessellations

- Polygon tessellations
- Applying symmetries



Leia K., 2012

# Tessellations



*Jacob K., 2002*

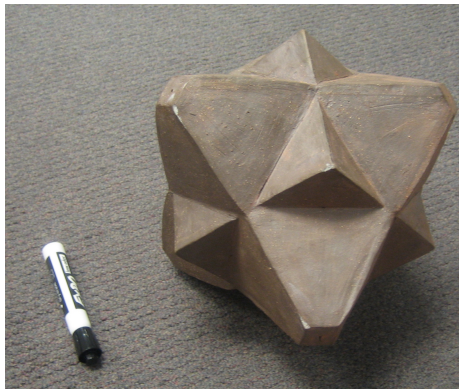


*Marissa N., 2012*



# Non-Euclidean Geometry

- Spherical geometry
- Hyperbolic geometry

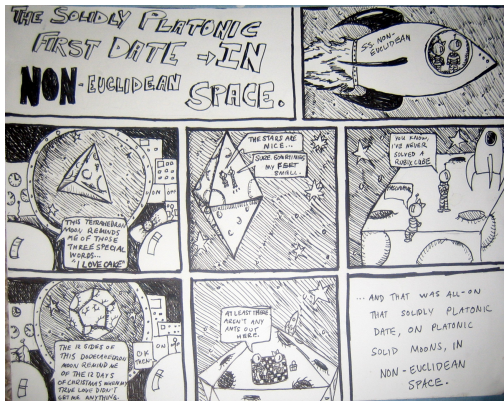


*Molly H., 2009*

# Non-Euclidean Geometry



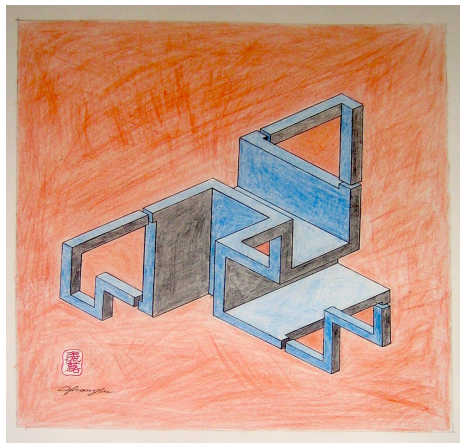
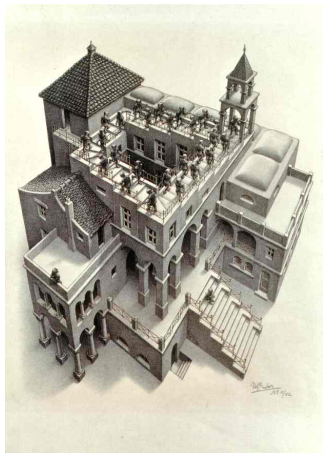
Taylor S., 2011



Simone S., 2013

# Art and Illusion

- Depth and perspective
- Ambiguous and impossible figures

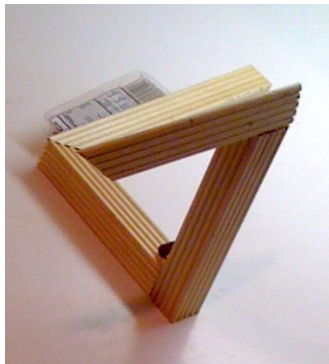


Lu Z., 2009

# Art and Illusion



Walter B., 2012



Tim S., 2008

# Quantitative Reasoning

## Objectives

- Problem solving
- Critical thinking

## Math and Escher

- Engaging subject
- Beautiful mathematics
- Challenging
- Not highly dependent on previous skills
- Allows for creativity
- Frontier mathematics:  
Recent results, open problems

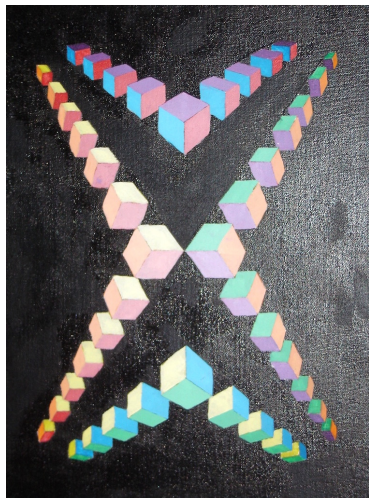


Neil P., 2012

# Art Assignments

2-4 projects during the semester

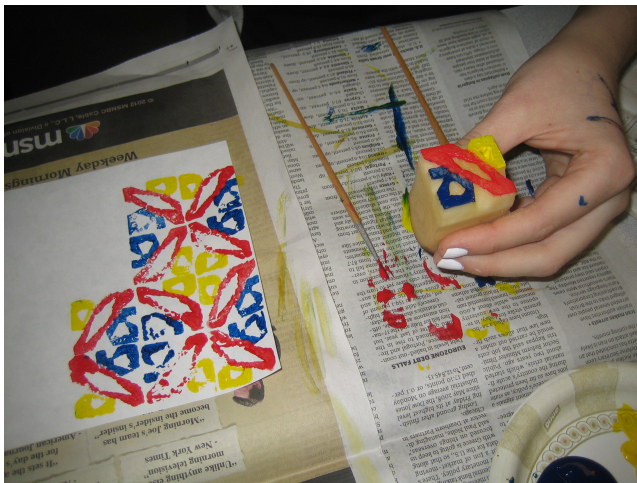
- Symmetric art
- Tessellation by recognizable figures
- Non-Euclidean art
- Perspective or illusion



*Katie W., 2005*

# In-class Support

- Tessellations: 3 days of in-class sketching learning different techniques
- Symmetry: Celtic knots, potato stamping, Islamic pattern drawing
- Test creative/art skills on exams



# Grading

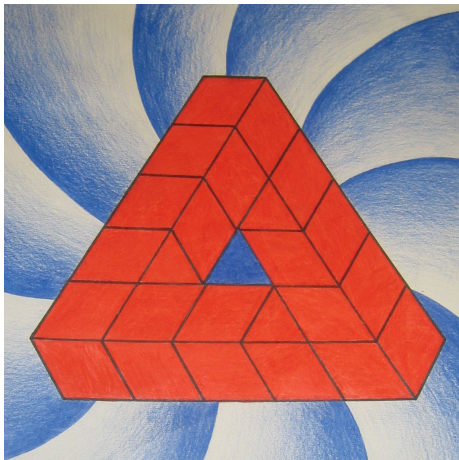
- Math complexity vs. Artistic skill
- Preliminary work
- Accuracy, materials, polish
- Documentation
- Grading rubric



Cecily E., 2008



# More Art!



Lyell B., 2010



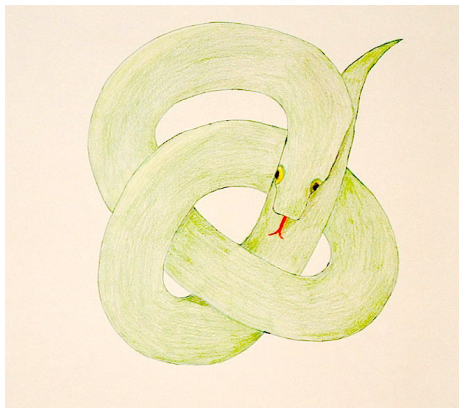
Chris L., 2008

# More Art!



Hayley R., 2010

# More Art!

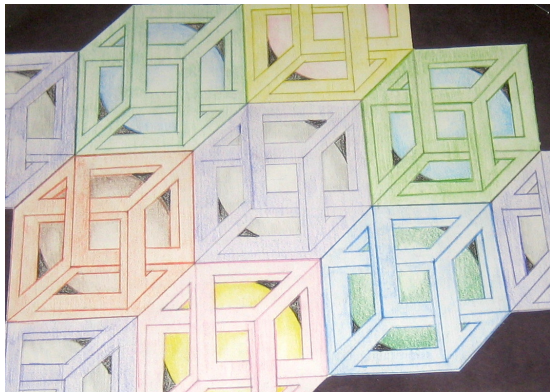


*Andrea M., 2002*



*Katie K., 2009*

# More Art!



*Ariana M., 2010*



*Joe S., 2005*

# The Wiki Textbook

- 2000-2007: Paper “reader” made of many Word documents
- 2007-present: Online wiki textbook, <http://math.slu.edu/escher>




Math & the Art of M.C. Escher





page discussion edit history delete move protect unwatch Bryan my talk my preferences my watchlist my contributions log out





## Math and the Art of M. C. Escher





About This Book




### Part One Euclidean and Non-Euclidean Geometry

Introduction to Mathematics and M.C. Escher  M.C. Escher  Escher on Display  Fundamental Concepts



Symmetry and Isometries  Introduction to Symmetry  Frieze Patterns  Wallpaper Patterns  Isometry Groups

Tessellations  Introduction to Tessellations  Tessellations by Polygons  Tessellations by Recognizable Figures  Aperiodic Tessellations

Non-Euclidean Geometry  Introduction to Non-Euclidean Geometry  Spherical Geometry  Hyperbolic Geometry  The Three Geometries

Activities For Part One  Seeking Symmetry  Tessellation Art Project  Non-Euclidean Geometry Project

### Part Two Topics in Geometry and Mathematics

Similarity and Fractals  Similarity Transformations  Fractals

readers

- Main Page
- Explorations
- Exercises
- Escher Artwork
- K-12 materials
- References

current courses

- Math 124 - Clair
- Parkway HS - BartMullikin

search

Go Search

instructors

- Resources
- Current events

editors

- Help
- Policies
- Recent changes
- Community portal

toolbox

- What links here
- Related changes

All materials are free and open for use. Join the wiki and contribute!

# Questions?

<https://www.youtube.com/watch?v=XdkWsxQwfGk&feature=youtu.be>

*Neil P., 2012*