

IDS 2935: Mathematics and the Humanities

Spring 23

Quest 1: The Examined Life

I. General Information

Class Meetings

- MWF3 (9:35-10:25 AM) in NRN 1037

Instructors

- Chrysostomos Kostopoulos
- Office: Turlington 2326B
- Office Hours: MWF4 (10:40-11:30am) and TR 3-4 (9:35-11:30am)
- Contact: ckostopo@ufl.edu

- Konstantina Christodouloupoulou
- Office: Little Hall 365
- Office Hours: M7 (1:55pm-2:45pm), W4 (10:40am-11:30am), F (11:45am-12:35pm)
- Contact: kchristod@ufl.edu

Course Description

For more than 3000 years, mathematics has been part of the human quest for knowledge and has helped us to understand the world that surrounds us. From ancient civilizations to our modern societies, mathematical discoveries and applications have constantly shaped the way we comprehend our environment and have given us the methodologies for analyzing and explaining our world. Through the centuries, the reach of mathematics has been extended beyond the physical sciences to practically every area of human endeavor, from industry to philosophy, and from art to politics.

This multidisciplinary course explores the humanistic side of mathematics and invites students to explore and discover the creative elements that are inherent in it. By examining how mathematics influenced and inspired philosophy, aesthetics, music, and art, we will address the following two essential questions:

- a. How various mathematical ideas and concepts have shaped our views about reality, our existence, and knowledge?
- b. How has mathematics fostered human flourishing by encouraging us to find truth, beauty, creativity, and imagination in a variety of human endeavors?

Although we will follow a historical approach in our lectures, this course is not a history of mathematics. Instead, it examines how certain mathematical ideas arose and how they influenced certain human activities, such as philosophy, writing, and art. We will begin our lectures with a discussion of the origins of rational inquiry in classical Greece and we will examine how mathematics has helped the passage from superstition to reason in the works of Pythagoras, Zeno, Plato, Aristotle, and Euclid. Then we will examine the impact of mathematics on art from ancient times to modern times. We will then discuss the influence of mathematics in the most revolutionary intellectual movement in Europe, the movement of the Enlightenment and we will conclude our journey with an overview of the relationship between humanities and mathematics in the 21st century.

Instruction will follow a Team-Teaching Model. Both instructors will be present and participate in each lecture co-operatively depending on the subject matter.

Quest and General Education Credit

- Quest 1
- Humanities
- Writing Requirement (WR) 2000 words

This course accomplishes the [Quest](#) and [General Education](#) objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Required Readings and Works

Gamwell, L., & Tyson, N. G. (2016). *Mathematics + art: A cultural history*. Princeton, New Jersey ; Oxford : Princeton University Press, 2016
ISBN: 9780691165288 0691165289

Recommended writing manual: Strunk, W. (1999). *The elements of style*.

All other readings and works are available in Canvas.

Materials and Supplies Fees: n/a

II. Graded Work

Description of Graded Work

Assignment	Assignment Description	General Education SLOs Met	Quest 1 Humanities SLO Met	Points

<p>Discussions (due weekly in Canvas Discussions)</p>	<p>There will be weekly discussion assignments on Canvas where the students will be asked to discuss topics related to the weekly lectures and readings. Specifically, the discussion assignments will require the following:</p> <p>a. Answer the question(s) posted in the weekly discussions. (100 points)</p> <p>b. Respond to at least two of your fellow students' original posts. (50 points)</p>	<p><i>Communication, Content, Critical Thinking (Analyze and Connect)</i></p>	<p>Identify, explain, and describe theories and methodologies</p>	<p>150</p>
<p>Adobe Express Story (due 3/24)</p>	<p>Visit the Harn Museum on the UF Campus. After your visit to the Museum, the students will create a story in Adobe Express where through images and written narrative they will describe and analyze two art works. The students should focus on the connection, or the lack thereof, between the artworks and certain mathematical</p>	<p><i>Communication, Critical Thinking (Analyze and Connect)</i></p>	<p>Connect course content to own lives</p>	<p>200</p>

	<p>concepts that we discussed in class, such as patterns, symmetry, perspective, etc. Examples of sample Adobe Express Stories will be provided ahead of time to guide the students.</p>			
<p>Analytical Essay Proposal (due 4/7)</p>	<p>Students will draft a 500-600 words proposal on a given essay prompt. The essay prompt will ask you to either examine a question or theme of a class text or to compare or contrast a theme from two class texts. The proposal should include an introductory paragraph, an outline of the points that are being addressed, and a draft bibliography of at least two sources. The essay proposal will be graded and marked for content, punctuation, spelling, syntax, and diction. The analytical essay proposal does not count towards the</p>	<p><i>Communication and Critical Thinking</i></p>	<p>Analyze and evaluate essential questions</p>	<p>50</p>

	WR 2000 words requirement.			
Analytical Essay (due 4/26)	A 2,000 words thesis-driven essay on the already provided essay prompt. The analytical essay will use the proposal as the mainframe. The essay will be graded and marked for content, organization and coherence, argument and support, punctuation, spelling, syntax, and diction. The essay counts towards the WR 2000 words requirement.	<i>Communication, Content, Critical Thinking (Analyze and Connect)</i>	Analyze and evaluate essential questions	250
Examination (in class, 2/24)	A fifty-minute Midterm Exam in lecture. The exam will be based on the course material and will consist of eighty (80) multiple-	<i>Content (Analyze and Connect), Communication</i>	Identify, explain, and, describe theories and methodologies	250

	choice questions and five (5) free-response questions.			
Attendance and Class Participation	In addition to roll call attendance in lectures, there will be numerous opportunities to participate through various in-class activities, such as think-pair-share, debates, peer-review, etc.	<i>Content (Analyze and Connect), Communication</i>	Identify, explain, and describe theories and methodologies	100
Total Points				1000

Grading Scale

For information on how UF assigns grade points, visit: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	94 – 100%		C	74 – 76%
A-	90 – 93%		C-	70 – 73%
B+	87 – 89%		D+	67 – 69%
B	84 – 86%		D	64 – 66%
B-	80 – 83%		D-	60 – 63%
C+	77 – 79%		E	<60

Grading Rubrics

Writing Assessment Rubric and Statements

	SATISFACTORY (Y)	UNSATISFACTORY (N)
CONTENT	Papers exhibit at least some evidence of ideas that respond to the topic with complexity, critically evaluating and synthesizing sources, and provide at least an adequate discussion with basic understanding of sources.	Papers either include a central idea(s) that is unclear or off-topic or provide only minimal or inadequate discussion of ideas. Papers may also lack sufficient or appropriate sources.
ORGANIZATION AND COHERENCE	Documents and paragraphs exhibit at least some identifiable structure for topics, including a clear thesis statement but may require readers to work to follow progression of ideas.	Documents and paragraphs lack clearly identifiable organization, may lack any coherent sense of logic in associating and organizing ideas, and may also lack transitions and coherence to guide the reader.
ARGUMENT AND SUPPORT	Documents use persuasive and confident presentation of ideas, strongly supported with evidence. At the weak end of the Satisfactory range, documents may provide only generalized discussion of ideas or may provide adequate discussion but rely on weak support for arguments.	Documents make only weak generalizations, providing little or no support, as in summaries or narratives that fail to provide critical analysis.
STYLE	Documents use a writing style with word choice appropriate to the context, genre, and discipline. Sentences should display complexity and logical sentence structure. At a minimum, documents will display a less precise use of vocabulary and an uneven use of sentence structure or a writing style that occasionally veers away from word choice or tone appropriate to the context, genre, and discipline.	Documents rely on word usage that is inappropriate for the context, genre, or discipline. Sentences may be overly long or short with awkward construction. Documents may also use words incorrectly.
MECHANICS	Papers will feature correct or error-free presentation of ideas. At the weak end of the Satisfactory range, papers may contain some spelling, punctuation, or grammatical errors that remain unobtrusive so they do not muddy the paper's argument or points.	Papers contain so many mechanical or grammatical errors that they impede the reader's understanding or severely undermine the writer's credibility.

- The Writing Requirement (WR) ensures students both maintain their fluency in writing and use writing as a tool to facilitate learning.
- The instructor will evaluate and provide feedback before the end of the course on all of the student's written assignments with respect to grammar, punctuation, clarity, coherence, and organization.
- WR course grades have two components. To receive writing requirement credit, a student must receive a grade of C or higher and a satisfactory completion of the writing component of the course.

Attendance and Participation

Attendance: You are expected to participate in class discussions. Therefore, it is essential that you attend class. You will be allowed 3 unexcused absences with no penalty. After this point, we reserve the right to drop your attendance and participation grade by 1% for each additional unexcused absence.

Excused absences are consistent with university policies in the undergraduate catalog and require appropriate documentation.

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Participation: We believe that participation during class is crucial, and it constitutes an important avenue for learning. We encourage you to be active in every class session. Class Participation will be evaluated using the rubric below. This Participation Grading Rubric covers expectations for individual contributions in all class discussions and smaller group discussions (think-pair-share, debate, etc.)

Note: We understand that we all have different levels of comfort regarding speaking in class. If you have any issues that prohibit you from participating in class, we encourage you to contact us so we can find ways to make participation work for you in this class. Any class missed will not affect your participation grade if you are within your allotted absences.

Participation Rubric

	High Quality	Average	Needs Improvement
Informed: Shows evidence of having done the assigned work. (40 points total)	Student contributes often in class to discuss the assigned work in relation to the topics discussed. (36-40 points)	Student contributes occasionally in class to discuss the assigned work in relation to the topics discussed. (32-35 points)	Student contributes rarely in class to discuss the assigned work in relation to the topics discussed. (0-31 points)
Thoughtful: Shows evidence of having understood and considered topics and ideas discussed. (30 points total)	Student contributes often in class to discuss readings and ideas, in relation to the topics discussed. (27-30 points)	Student contributes occasionally in class to discuss readings and ideas, in relation to the topics discussed. (24-26 points)	Student contributes rarely in class to discuss readings and ideas, in relation to the topics discussed. (0-23 points)
Considerate: Takes the perspective of others into account. (30 points total)	Student almost always listens to the ideas of others and incorporates them into their own perspectives. (27-30 points)	Student usually listens to the ideas of others and incorporates them into their own perspectives. (24-26 points)	Student rarely or never listens to the ideas of others. (0-23 points)

III. Annotated Weekly Schedule

Week	Topic	Summary	Required Readings/Works	Assigned Work Due
Week 1 (1/9-1/13)	Course Introduction:			Discussion 1

	<p>What is Mathematics? What is Humanistic Mathematics?</p>	<p>After looking briefly at the history of mathematics from its ancient origins to today we will discuss what mathematics is and examine the new perspective to mathematical thinking that humanistic mathematics has introduced.</p>	<p>Su, F. 2020, <i>Mathematics for Human Flourishing</i>, pp.1-47, 67-83</p> <p>Gamwell, pp. 32-34, 39-47</p>	
<p>Week 2 (1/18-1/20)</p>	<p>Mathematical Research Methods and how they are different from the Methods of Research in Humanities.</p>	<p>We will provide an overview of the essential methods of research in mathematics and the humanities, and we will examine their differences and similarities.</p>	<p>Davis, P. J and Hersh, R. 1981, <i>The Mathematical Experience</i>, pp. xvii-28</p> <p>Munro, L. (2010). <i>What about history? Lessons from seven years with project-based learning</i>. Teaching History, Vol. 138, pp. 48-52</p>	<p>Discussion 2</p>
<p>Week 3 (1/23-1/27)</p>	<p>Pythagoras, Philosophy, Music and Mathematics Part I</p>	<p>We will begin our discussion of the mathematical and philosophical ideas of Pythagoras and his followers and examine their influence on Greek philosophy, especially on Plato.</p>	<p>Gamwell, pp. 1-15</p> <p>Kline, M. 1964, <i>Mathematics in Western Culture</i> pp.13-39</p>	<p>Discussion 3</p>
<p>Week 4 (1/30-2/3)</p>	<p>Pythagoras, Philosophy, Music and Mathematics Part II</p>	<p>We will continue our discussion on Pythagoras with an examination of the relationship between mathematics and music. We will focus on the Pythagorean tuning, musical and mathematical intervals, and the notion of irrational numbers</p>	<p>Fauvel, J., Flood, R., and Wilson, R., Editors, <i>Music and Mathematics</i>, pp. 1-27.</p>	<p>Discussion 4</p>

Week 5 (2/6-2/10)	Plato's Meno, the Philosopher and the Slave	We will examine the influence of geometry in Platonic philosophy, and we will see how mathematics has provided the basis of Plato's theory of knowledge.	Plato, <i>Meno</i>	Discussion 5
Week 6 (2/13-2/17)	Plato's Allegory of the Cave in the Republic. Can Mathematics describe reality?	We will discuss the most famous of the Platonic dialogues, the Republic, focusing on the central allegory of the cave and we will examine the question of whether mathematics can describe reality, a question that has occupied the minds of Plato as well as many modern thinkers.	Plato, <i>Republic</i> (514a-520a)	Discussion 6
Week 7 (2/20-2/24)	Reductio ad Absurdum. Logic, Logical Fallacies, and Mathematics in Greek Philosophy.	We will discuss the impact of mathematics on the origins of logical principles in ancient Greek philosophy, particularly Zeno, Aristotle, and Euclid. We will also discuss how Zeno's paradoxes provided some of the first examples of a method of proof called "reductio ad absurdum", also known as proof by contradiction.	Aristotle, <i>Physics</i> VI:9, 239b10 Aristotle, <i>Physics</i> VI:9, 239b15 Aristotle, <i>Physics</i> IV:1, 209a25 Wardhaugh, B. 2021, <i>Encounters with Euclid</i> , pp. 7-17. Gamwell, pp. 17-22, 109-112, 197-205	Mid-Term Exam (2/24, in class)

Week 8 (2/27-3/3)	Symmetry, Mathematics, and Art Part I	We will examine the relationship between mathematics and art focusing on the concept of symmetry.	Gamwell, pp. 47-56, 67-71, 225-247, 249-261	Discussion 7
Week 9 (3/6-3/10)	Symmetry, Mathematics, and Art Part II	We will continue our discussion on the impact of mathematical symmetry on art from classical Greek architecture to the paintings of Leonardo Da Vinci and the graphical designs of M.C. Escher.	Gamwell, pp. 321-341	Visit the Museum and work on the Adobe Express Story
Week 10 (3/20-3/24)	The establishment of perspective in art. Part I	We will discuss the human perception of space and how this perception was shaped by mathematics	Gamwell, pp. 73-107	Adobe Express Story due on 3/24
Week 11 (3/27-3/31)	The establishment of perspective in art Part II	We will continue our examination of perspective by examining the way projective geometry was influenced and used by painters and architects, including Leonardo da Vinci, Rafael, Michelangelo, and Durer.	Kline, M. 1964, <i>Mathematics in Western Culture</i> pp. 144-158 Wardhaugh, B. 2021, <i>Encounters with Euclid</i> , pp. 212-224	Discussion 8
Week 12 (4/3-4/7)	The influence of mathematics on the European Enlightenment Part I	We will begin our discussion on the influence of mathematics on the European Enlightenment by providing an overview of the movement of the Enlightenment, a significant intellectual and philosophical	Kant, I. 1784, <i>What is Enlightenment</i> Gamwell, pp.109-117, 124-131	Essay Proposal due on 4/7

		movement that dominated Europe in the 17th and 18th centuries.		
Week 13 (4/10-4/14)	The influence of mathematics on the European Enlightenment Part II	We will continue our examination of mathematics and the Enlightenment by examining the impact of mathematics in the philosophical writings and ideas of Descartes, Spinoza, and Kant.	Kline, M. 1964, <i>Mathematics in Western Culture</i> pp. 159-165, 234-256 Wardhaugh, B. 2021, <i>Encounters with Euclid</i> , pp. 151-160.	Discussion 9
Week 14 (4/17-4/21)	Non-Euclidean geometry and its impact on art, architecture, and modern philosophy.	We will discuss non-Euclidean geometry and how it changed human perception by negating the views of the Enlightenment that there are absolute truths. We will also examine its impact on art, architecture, and philosophy.	Wardhaugh, B. 2021, <i>Encounters with Euclid</i> , pp. 260-268 Kline, M. 1964, <i>Mathematics in Western Culture</i> pp. 410-431 Gamwell, pp. 151-164, 310-317, 385-403	Discussion 10
Week 15 (4/24-4/26)	Conclusion. Humanistic mathematics in the 21st century.	We will conclude our course with an overview of what we have examined during the semester and some thoughts on the role and interaction of mathematics with the humanities in the 21 st c.	Gamwell, pp. 455-509	Analytical Essay due on 4/26

IV. Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the [Quest](#) and [General Education](#) learning outcomes as follows:

- Students will be able to identify the key theories, methodologies, and personalities in the history of mathematics and their impact on various aspects of human culture and civilization, such as philosophy, literature, music, and art. (Content SLOs for Gen Ed Hum, and Q1)
- Students will be able to discuss, analyze, and evaluate key texts in the history of philosophy and point out their relationship with certain mathematical ideas and methods. (Content and Critical Thinking SLOs for Gen Ed Hum, and Q1)
- Students will be able to discuss, analyze and evaluate the role and impact of mathematics into art and provide specific examples of art works that demonstrate the impact of mathematics into art. (Content and Critical Thinking SLOs for Gen Ed Hum, and Q1, Connection SLOs for Q1)
- Students will be able to understand the development of mathematics within and across various civilizations and cultures and recognize how mathematics and culture are often interconnected. (Critical Thinking SLOs for Gen Ed Hum, and Q1, Connection SLOs for Q1)
- Students will be able to communicate their knowledge, thoughts, and reasoning clearly and effectively in written and oral form through class assignments, such as online discussions, the writing of stories, essay, etc. (Communication SLOs for Gen Ed Hum, and Q1)
- Students will be able to develop critical thinking by identifying and analyzing key figures, main influences, significant contradictions, and potential outcomes within the subject of the course and enhance their ability to differentiate between opposite points of view and interpreting and evaluating sources. (Critical Thinking SLOs for Gen Ed Hum, and Q1)

V. Quest Learning Experiences

1. Details of Experiential Learning Component

This class includes an experiential learning component in which students will actively engage with a UF resource. As such, the class requirements include a visit to the Harn Museum on the UF Campus. After their visit to the Museum, the students will create a story in Adobe Express where through images and written narrative they describe and analyze two art works. The students should focus on the connection, or the lack thereof, between the artworks and certain mathematical concepts that we discussed in class, such as patterns, symmetry, perspective, etc. Examples of similar Adobe Express Stories will be provided ahead of time to guide the students.

2. Details of Self-Reflection Component

Students will reflect on the reading material provided each week and share their thoughts both through in-class participation as well as by discussion posts on Canvas. These activities will be due weekly.

VI. Required Policies

Attendance Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: <http://www.counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at <http://writing.ufl.edu/writing-studio/> or in 2215 Turlington Hall for one-on-one consultations and workshops.

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and

delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.