

Paradoxes: The Mathematics of Nonsense

Mondays and Wednesdays from 3:40pm – 5:40pm in JOY 001

Instructor: Haley Skipper
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Email: hskipper@uw.edu (best way to contact me is through Canvas)
Office Hrs in TLC: Tuesdays and Wednesdays 2 - 3:15pm (or by appointment)
Note: The Teaching and Learning Center (TLC) is located on the 2nd floor of Snoqualmie building.

Textbooks

Paradoxes in Mathematics by Stanley J Farlow (Required)
An Illustrated Book of Bad Arguments by Ali Almossawi (Required)

Course Description:

Paradox is a statement which leads to consequences or results which are strikingly counter to intuition or established results. This is a course that explores and analyzes different types of paradoxes and their resolutions. We will study self-referential paradoxes, probabilistic and statistical paradoxes, visual paradoxes, paradoxes of infinity and infinitesimal, among others.

Basic Expectations:

- (a) Actively engage in all class discussions, activities, and ask questions that are relevant and move the discussion forward.
- (b) Be respectful of others rights to speak.
- (c) Criticize arguments, not the person who makes it.

In order to be successful in this course, you should do the following:

- Come to class every day, on time, ready to go.
- Check Canvas everyday: make sure your Canvas account is linked to your UW e-mail account.
- Turn in your assignments on time.
- Follow directions, and ask for clarification if you don't understand something.
- Participate fully in classroom conversations.
- Be respectful of your instructor as well as your peers.
- Promote the learning environment through the kinds of questions you ask and your own attitude towards learning.

Grading:

Your final grade will be determined by your performance on the following graded events:

Participation:	10%	
Homework:	30%	(lowest score dropped)
Quizzes:	20%	(lowest score dropped)
Project:	15%	
Final:	25%	

Participation/In-Class Work:

Class activities, worksheets, and discussions will be graded.

You are expected to attend class regularly, show up to class on time, return from class breaks on time, pay attention during class, not disrupt class with talking or the use of cell phones or other inappropriate devices, and participate in class discussions and complete in-class work. **If you miss class**, it is your responsibility to contact me about the material and announcements you missed and to check Canvas.

Homework:

Homework is assigned weekly, and they are due on following Mondays at the beginning of class. It will consist of problems similar to those discussed in lecture. I encourage you to work with others, but the final work should be written by you in your **own words**. Write up neatly, and show work for full credit. No late assignments will be accepted. If you are not able to make it to class, submit your solution under my office door or via Canvas email sometime before class.

Quizzes:

There will be four quizzes at 5% each on weeks 3, 5, 7, and 9. Problems designed for quizzes will be modification of problems discussed in class or assigned for homework. No make-up quizzes will be given, but at the end of the quarter, your lowest quiz score will be dropped.

Project:

There will be a group game design project worth 15% of your grade. You will present to the class during Week 10. More details to come.

Final Exam:

The final exam will be given on Wednesday, June 12th from 3:40pm – 4:40pm (JOY 001)

Course Documents:

Course materials will be posted on Canvas. All students are expected to check for updated information on a regular basis. All course documents, syllabus, and grades will be posted on the course website.

Tentative Schedule:

Week 1: Liar's paradox, Introductory logic, Knights and knaves problems;

Week 2: Barber's paradox, Logical fallacies, Introductory set theory;

Week 3: Monty Hall paradox, Introductory probability theory, Quiz 1;

Week 4: Birthday Paradox, Number guessing game, St Petersburg Paradox;

Week 5: Simpson's paradox, Gerrymandering, Introductory Voting Theory, Quiz 2;

Week 6: Friendship paradox, Introductory graph theory;

Week 7: Visual paradoxes, Escher's perspective drawings, 3D movies, Quiz 3;

Week 8: Chocolate paradox, Hilbert's grand hotel, Introduction to infinities;

Week 9: Zeno's paradox, Quiz 4; (No Class Monday)

Week10: Project presentations, Review

Student Learning Objectives:

This course focuses on the following objectives. Students should:

1. Interpret mathematical models and draw inferences.
2. Represent mathematical information symbolically, visually, numerically, and verbally.
3. Use arithmetical, algebraic, geometric and statistical methods to solve problems.
4. Be able to estimate and check answers to math problems in order to determine reasonableness, identify alternatives, and select optimal results.
5. Recognize that mathematical and statistical methods have limits.
6. Synthesize varied resources to develop a coherent understanding of a topic.
7. Recognize and understand logical fallacies, and be able to distinguish them from good parts.
8. Apply critical thinking skills to everyday life.

Grade Scale:

The University of Washington uses a numerical grading system. At the undergraduate level, instructors may report grades from 4.0 to 0.7 in 0.1 increments, and the grade 0.0. The number 0.0 is assigned for failing work or an unofficial withdrawal. Numerical grades may be considered equivalent to letter grades as follows:

Letter Grade	Decimal Grade	Percentage	Letter Grade	Decimal Grade	Percentage
A	4.0	95-100%	C+	2.4	79%
	3.9	94%		2.3	78%
A-	3.8	93%		2.2	77%
	3.7	92%	C	2.1	76%
	3.6	91%		2.0	75%
	3.5	90%		1.9	74%
B+	3.4	89%	C-	1.8	73%
	3.3	88%		1.7	72%
	3.2	87%		1.6	71%
B	3.1	86%		1.5	70%
	3.0	85%	D+	1.4	69%
	2.9	84%		1.3	68%
B-	2.8	83%		1.2	67%
	2.7	82%	D	1.1	66%
	2.6	81%		1.0	65%
	2.5	80%		0.9	64%
			D- (lowest passing grade)	0.8	62-63%
				0.7	60-61%
			E (no credit earned)	0.0	0-59%

Teaching and Learning Center (TLC):

The Teaching and Learning Center (TLC) offers free academic support for students at all levels. We offer one-on-one consultations and group workshops in writing, math, statistics, science, and Spanish. We also work with students on questions about English grammar & vocabulary, reading, and learning strategies. We are located in Snoqualmie 260 and online. Our schedules for appointments and drop-in visits are posted on our website at <http://www.tacoma.uw.edu/tlc>. For special needs or subject tutoring requests, please email uwttteach@uw.edu or call 253.692.4417.

Hours for Spring Quarter are: **Monday - Thursday: 9am - 7pm and Friday: 9am - 3pm**

Library

The Tioga Library Building (TLB) provides resources and services to support students at all levels of expertise. For assistance or to schedule an appointment, visit the Reference Desk in the Library, email tacref@u.washington.edu or phone 253-692-4440. For more information about the Library and its services, see <http://www.tacoma.uw.edu/library>

Plagiarism

A major part of your experience at UW Tacoma will be reading, synthesizing, and using the knowledge and ideas of others. To plagiarize is to use the ideas--or unique phrasing of those ideas--without acknowledging that they originate from someone or someplace other than you. Attributing where you get your information builds your own authority to speak on that topic and provides valuable backing to the arguments you make. Attribution also distinguishes your ideas and words from those of others who came before you. At the University of Washington, plagiarism is a violation of the student conduct code, and the consequences can be serious. Though citing, quoting, and paraphrasing can be confusing at first, it is essential for your success at UWT that you familiarize yourself with these important conventions of academic writing. Additionally, plagiarism can be understood differently in various disciplines. For instance, the ways in which one summarizes others' ideas in texts, or attributes information from texts in one's own paper, are not the same in the sciences as they are in the humanities, or the social sciences. This means it is vital that you understand the specific expectations and guidelines for writing that will help you avoid plagiarizing in this class. If you have questions about what amounts to plagiarism, you are strongly encouraged to seek guidance from the Teaching and Learning Center as soon as possible.

For more information, please refer to:

Academic Honesty: <http://www.tacoma.uw.edu/uwt/enrollment-services/academic-honesty>

Student Counseling Center: <http://www.tacoma.uw.edu/counseling>

Student Counseling Center (SCC):

The Counseling Center offers short-term, problem-focused counseling to UW Tacoma students who may feel overwhelmed by the responsibilities of college, work, family, and relationships. Counselors are available to help students cope with stresses and personal issues that may interfere with their ability to perform in school. The service is provided confidentially and without additional charge to currently enrolled undergraduate and graduate students. To schedule an appointment, please call 253-692-4522, email uwtshaw@uw.edu, or stop by the Student Counseling Center (SCC), located in MAT 354. Additional information can also be found by visiting www.tacoma.uw.edu/counseling.

Disability Resources for Students (DRS): The University of Washington Tacoma is committed to making physical facilities and instructional programs accessible to students with disabilities. Disability Resources for Students (DRS), located in MAT 354, functions as the focal point for coordination of services for students with disabilities. If you have a physical, emotional, or mental disability that "substantially limits one or more major life activities [including walking, seeing, hearing, speaking, breathing, learning and working]," and will require accommodation in this class, please contact DRS at 253-692-4508, or email at drs@uw.edu for assistance.

Campus Safety Information

Escort Service

Safety escorts are available 24 hours a day, 7 days a week, there is no time limit. Call the main office line at 253.692.4416.

In case of a fire alarm

During an emergency evacuation, take your valuables ONLY if it is safe to do so. You could put yourself or someone else at risk by delaying your exit. Plan to return to class once the alarm has stopped. Do not return until you have received an all-clear from somebody "official," the web or email.

In case of an earthquake

DROP, COVER, and HOLD. Once the shaking stops, take your valuables and leave the building. Do not plan to return for the rest of the day. Do not return to the building until you have received an all-clear from somebody "official," the web or email.

For more information:

Campus Safety and Security: <http://www.tacoma.uw.edu/campus-safety/campus-safety-security>

SafeCampus: <http://www.washington.edu/safecampus/uwt>

Incomplete

An Incomplete is given only when the student has been in attendance and has done satisfactory work until within two weeks of the end of the quarter and has furnished proof satisfactory to the instructor that the work cannot be completed because of illness or other circumstances beyond the student's control. A written statement of the reason for the giving of the Incomplete, listing the work which the student will need to do to remove it, must be filed by the instructor with the head of the department or the dean of the college in which the course is given.

Email Policy

<http://www.tacoma.uw.edu/information-technology/uw-tacoma-email-policy>

Electronic Devices

Electronic devices (including, but not limited to, cell phones, tablets and laptops) may only be used in the classroom with the permission of the instructor. Activities that are not relevant to the course, such as checking/ sending email, playing games and surfing the web, are considered disruptive activities when class is in session.

Inclement Weather

Call 253-383-INFO or check the UW Tacoma homepage to determine whether campus operations have been suspended or delayed. If not, but driving conditions remain problematic, call the professor's office number. This number should provide information on whether a particular class will be held or not, and/or the status of pending assignments. If the first two numbers have been

contacted and the student is still unable to determine whether a class(es) will be held, or the student has a part-time instructor who does not have an office phone or contact number, call the program office number for updated information.

Academic Support

Numerous campus resources are available to support your academic success. Know your options and seek help and resources when needed.

- **Disability Resources for Students (Office of Student Success)** - The University of Washington Tacoma is committed to making physical facilities and instructional programs accessible to students with disabilities. Disability Resources for Students (DRS), located in MAT 354, functions as the focal point for coordination of services for students with disabilities. If you have a physical, emotional, or mental disability that "substantially limits one or more major life activities [including walking, seeing, hearing, speaking, breathing, learning and working]," and will require accommodation in this class, please contact DRS at 253-692-4508, or email at drs@uw.edu for assistance.
- **Library** - The UW Tacoma Library provides resources and services to support finding resources for your assignments. We guide students through the research process, helping you learn how to develop effective strategies and find and evaluate appropriate resources. In addition to research and instructional support, we manage course reserves and print and digital collections and provide spaces for group and individual study. For assistance or more information, visit our service desks, located in SNO and TLB, or our website, tacoma.uw.edu/library/library.
- **Research Support** - Get assistance starting a research project.
- **Subject Librarians** - Make an appointment with a subject librarian to talk about library resources, research strategies, focusing a topic, evaluating information and more.
- **Teaching and Learning Center** - The Teaching and Learning Center offers free academic support for students at all levels. We offer one-on-one consultations and group workshops in writing, math, statistics, science, and Spanish. We also work with students on questions about English grammar & vocabulary, reading, and learning strategies. We are located in Snoqualmie 260 and online. Our schedules for appointments and drop-in visits are posted on our website at tacoma.uw.edu/tlc. For special needs or subject tutoring requests, please email uwtteach@uw.edu or call 253-692-4417. (TLC) 2nd floor of the Snoqualmie building
- **Writing & Spanish support**: writing consultations, online tutoring, workshops & support
- **Quantitative skills support**: peer tutoring available for math, science, statistics and more...
- **ESL Support** - Help for students whose first language is not English
- **Technology Support** - Labs, software, equipment checkout and help with Canvas, Google, email, logins, etc.

Self and Family Support: *Everyone needs a little help sometimes. Here are a few campus resources on campus to help you get through those challenging times.*

- **Bias Incident Reporting Website** - A resource for anyone who needs to report an incident of bias or wants to explore and better understand issues like bias and discrimination, and how to effectively respond.
- **Center for Equity & Inclusion** (WCG 104) - Resources and support for students regarding diversity, equity, inclusion and social justice issues.
- **Student Success Mentoring Program** - Connect with a faculty or staff mentor
- **Counseling Center (Office of Student Success)** - The Counseling Center offers short-term, problem-focused counseling to UW Tacoma students who may feel overwhelmed by the responsibilities of college, work, family, and relationships. Counselors are available to help students cope with stresses and personal issues that may interfere with their ability to perform in school. The service is provided confidentially and without additional charge to currently enrolled undergraduate and graduate students. To schedule an appointment, please call 253-692-4522, email uwtsshaw@uw.edu, or stop by the Student Counseling Center (SCC), located in MAT 354. Additional information can also be found by visiting www.tacoma.uw.edu/counseling.
- **UWT student Health Center** - LBH 102; 1742 Market Street, Tacoma WA, 98402. Basic services at Student Health Services (SHS) are provided at no cost to currently enrolled UW Tacoma students. However, you may incur costs for services provided off campus, such as lab tests, and for some on-campus services, such as immunizations. The SHS staff will identify any services that you would have to pay for. http://www.tacoma.uw.edu/studentaffairs/SHW/shs_healthservices_about.cfm.html
- **The Pantry** - Providing supplemental, nutritional, and culturally relevant food as well as hygiene items to all UWT students and their families. Location and information can be found by visiting: tacoma.uw.edu/thepantry OPTIONS: 1) Stop by during weekly drop-in hours (DOUGAN 104) Wednesdays: 10:30am-1:00pm | Thursdays: 1:00pm-5:00pm; 2) Complete the online Food Request Form at tacoma.uw.edu/thepantry; 3) Contact us on an individual basis (emergency situations) - Jane Schrader Hayes | jkschray@uw.edu | 253.692.4325
- **Resources for low income and people experiencing homelessness:** <http://mdc-hope.org>
- **Shelter for Young adults near our campus:** Beacon Center - Shelter for young adults 18-24. Open daily 6:30pm – 6:30am. Doors close at 10 pm. Located at: Beacon Senior Center 415 South 13th Street Tacoma, WA. The shelter has 40 beds and serves young people ages 18-24. Please call 253-256-3087 for more information. <http://www.communityyouthservices.org/piercecounty.shtml>
- **Oasis center** - Oasis transforms the lives of queer youth by creating a safe place to learn, connect, and thrive. Oasis envisions a world in which queer youth are valued in the community as strong, creative leaders. Oasis is the only drop-in and support center dedicated to the needs of LGBTQ youth ages 14-24 in Pierce County. We are a youth-adult partnership in which youth and adults come together for shared teaching learning and action! **Office Phone: 253-671-2838.** Emergency Cell Phone: (253) 988-2108