

Do we live in a simulation? - Syllabus

Instructor Information

- **Name:** Alysse Weigand
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 - **Response time:** usually within a few hours, not to exceed 3 days. Emails received after 2pm on Friday will receive a response the following Monday.
- **Office Location:** Flarsheim Hall Room #219
- **Student Support Hours:** TBD & by appointment

Catalog Information

- **Subject:** Critical Thinking in the Natural Sciences (GECRT-SC)
- **Course Title:** How do I live in a changing world?
- **Section:** 10
- **Section Title:** Do we live in a simulation?
- **Catalog Number:** 101
- **Class Number:** 16396
- **Course Description:** Students will investigate the natural and physical world through testable questions, models, hypotheses or discoveries and evaluate different lines of evidence including observations and measurements. Students will apply natural and physical science techniques and use results and conclusions to explain and appreciate the natural and physical phenomena that impact our lives, our community and the world in which we live.
- **Class Notes:** Topic: *Do we live in a simulation?*; This section will explore how to use simulations to find, explore, define, and respond to the root causes of change wherever they are encountered. We will use that knowledge to study whether or not our reality is itself a simulation.
- **Meeting Time & Place:** MWF 12 – 12:50; MNLC 351
- **Semester Offered:** Spring 2025
- **Credit Hours:** 3
- **Prerequisites / Co-requisites:** None
- **Restrictions / Exclusions:** None
- **Course Attributes:** UMKC Essentials, Focus B – Scientific Reasoning and Quantitative Analysis
- **Course Component:** Lecture
- **Course Instructional Mode:** Classroom Based

Text Information

- **Required Materials:**
 - [*The Information: A History, A Theory, A Flood*](#) by James Gleick; Available from the UMKC Bookstore, Amazon.com, and other retailers or internet resources.

Topics

- **Course Topics Covered and Assignment Headlines:** (Detailed schedule in a later section.)
 - *The Information*
 - One simulation assignment per major section.
 - Creation of an Elevator Pitch (defined in supplementary materials).
 - Participation in a Town Hall event (defined in supplementary materials).
 - A Signature Project (defined in supplementary materials).

Grading

- **Grading Scale:**

(90 – 87]	B+	[100 – 93]	A	(93 – 90]	A-
(80 – 77]	C+	(87 – 83]	B	(83 – 80]	B-
(70 – 67]	D+	(77 – 73]	C	(73 – 70]	C-
		(67 – 63]	D	(63 – 0]	F

- **Assignment Types and Value Distributions:**
 - NetLogo: 30% (Five Assignments; paper and video presentation)
 - Reading: 20% (15 Discussion Posts)
 - Elevator Pitch: 5% (See below)
 - Town Hall: 5% (See below)
 - Final Project: 20% (See below)
 - Participation : 10% (Engagement in lecture sessions & post-class reflections)
 - Final Exam: 10%

Student Learning Outcomes

- **SLO #1:** The student will be able to identify a topic, problem, or issue to be addressed.
- **SLO #2:** The student will be able to locate relevant information representing various points of view.
- **SLO #3:** The student will be able to evaluate alternative points of view.
- **SLO #4:** The student will be able to synthesize diverse points of view.
- **SLO #5:** The student will be able to draw a conclusion that is a logical inference from the evidence.

Additional Goals Specific to this Section

- The student will be able to define the concepts of simplicity, randomness, and complexity.
- The student will be able to recognize manifestations of those concepts in computational /physical processes.
- The student will be able to execute the technical steps required to run an existing NetLogo-based model in a computational environment.
- The student will be able to extend a NetLogo-based model.

Course Schedule

*Due dates may be subject to change based on in-class progress. Response due dates are not listed on the calendar. Post-Class Reflection Posts are not listed on the calendar. Calendar is subject to change at instructor's discretion. This is a “best guess” not “set in stone”

Date		Topics of Discussion	Readings	Due
All assignments due at start of class				
Week 01	Mon Jan 20	Introduction to the Class	Prologue	
	Weds Jan 22			
	Fri Jan 24			Discussion Post - Prologue
Module 1: Simulations, Models, and Theory				
Week 02	Mon Jan 27	Critical Thinking and the Simulation Hypothesis	Chapter 1	
	Weds Jan 29			
	Fri Jan 31			Discussion Post – Chapter 1
Week 03	Mon Feb 3	Models and Computation in Science	Chapter 2	
	Weds Feb 5			
	Fri Feb 7			Discussion Post – Chapter 2
Week 04	Mon Feb 10	Reality to Simulation	Chapter 3	Town Hall Position Statement
	Wed Feb 12			
	Fri Feb 14			Discussion Post – Chapter 3
Town Hall				
Week 05	Mon Feb 17	Town Hall	Chapter 4	NetLogo – Introduction to Models
	Weds Feb 19			
	Fri Feb 21			Discussion Post – Chapter 4
Module 2: Cellular Automata				
Week 06	Mon Feb 24	Cellular Automata and the Game of Life	Chapter 5	Town Hall Reflections
	Weds Feb 26			
	Fri Feb 28			Discussion Post – Chapter 5
Week 07	Mon Mar 3	Emergence	Chapter 6	
	Weds Mar 5			
	Fri Mar 7			Discussion Post – Chapter 6
Module 3: Ising Model				
Week 08	Mon Mar 10	Computable Reality & Ising Intro	Chapter 7	NetLogo – Cellular Automata
	Weds Mar 12			
	Fri Mar 14			Discussion Post – Chapter 7
Week 09	Mon Mar 17	Ising, Magnets, and Consciousness	Chapter 8	
	Weds Mar 19			
	Fri Mar 21			Discussion Post – Chapter 8
Week 10	Spring Break			
Module 3: Molecular Dynamics				
Week 11	Mon Mar 31	Intro to Molecular Dynamics	Chapter 9	NetLogo - Ising
	Weds April 2			
	Fri April 4			Discussion Post – Chapter 9

Date		Topics of Discussion	Readings	Due All assignments due at start of class
Week 12	Mon April 7	How real is it?	Chapter 10	Elevator Pitch Due
	Weds April 9			
	Fri April 11			Discussion Post – Chapter 10
Module 4: MD + Potential				
Week 13	Mon April 14	External Forces	Chapter 11	NetLogo – MD
	Weds April 16			
	Fri April 18			Discussion Post – Chapter 11
Week 14	Mon April 21	Quantum	Chapter 12	
	Weds April 23			
	Fri April 25			Discussion Post – Chapter 12
Week 15	Mon April 28	Quantum cont.	Chapter 13	NetLogo – MD + V
	Weds April 30			
	Fri May 2			Discussion Post – Chapter 13
Final Project				
Week 16	Mon May 5	Final Project	Chapter 14	Final Project @ 11:59 pm
	Weds May 7			
	Fri May 9			Discussion Post – Chapter 14
Final Exam	Wednesday, May 14 th 8-10 am	Finals Week	Chapter 15 + Epilogue	Discussion Post – Chapter 15 Final Reflection

FINAL EXAM: Wednesday, May 14 8-10 am

Elevator Pitch Assignment Preview

An elevator pitch is a short verbal interaction with another person in which you attempt to succinctly (briefly) combine an introduction, problem statement, solution, and actionable next step that the other person could take. The word “pitch” is used instead of “speech” to explicitly indicate that the goal is to persuade the other person to do something in response to what you say. In many practical scenarios the goal might be to convince someone to purchase something, donate money, invest in a start-up company, vote for someone, or join a group for some purpose or cause.

In this exercise, I would like to encourage a “refined” presentation with a tone that appeals more to the one-on-one interaction you might have at a social function with a government policymaker, an executive from your company, the dean of your college or school, a potential donor/investor to your company or non-profit organization, one of your high school teachers or administrators, the parent of a friend who is still in high school, or any other intellectual guest. **Your assignment is to create a two-minute long “elevator pitch” that explains why a General**

Education – Critical Thinking in the Natural Sciences classes are important for anyone’s general university education. It does not have to be specific to this course, make the pitch generalized to all General Education – Critical Thinking courses.

You will create a two-minute elevator pitch that

- (a) introduces the topic (for say ~15 seconds);
- (b) explains how the process of science serves as an answer to the second question (using let’s say ~15-25 seconds)
- (c) explains why a General Education – Critical Thinking in the Natural courses are important for anyone’s general university education *along with* the barriers that prevent action (for say ~65-80 seconds)
- (d) ending with either a subtle or an explicit call to action from whomever you are directing your pitch to for the final say ~10-15 seconds. (The total duration of the pitch must be less than or equal to 120 seconds.)

This description is a **preview** of the full assignment. You must access the complete assignment document on Canvas and prepare your assignment using the specific details and guidance contained therein.

Round Table Town Hall Assignment Preview

A dominant fraction of the basic science teaching, learning, and doing in the United States is performed at universities such as UMKC by faculty and students such as yourselves.

For the Round Table Town Hall exercise in week five you will each be assigned to take on the role of a particular stakeholder that is somehow relevant to UMKC. Your charge is to learn about the role that you have been assigned and then create a two-and-a-half minute (150 second) position statement that (1) introduces your role; (2) explains the concerns of a generic person in that role; and (3) gives an oral argument for your preferred method for defining how faculty should balance research, teaching, and service; followed by (4) an explicit numerical percent assignment for that balance (e.g., 1% research, 99% teaching, and 0% service).

After learning your role, you will meet in class on a Tuesday with four or five other students that have been assigned the same role and you will create a “consensus” opinion for your role. Then, on Thursday the class will hold a mock Round Table Town Hall. One representative from each stakeholder group will have two minutes and thirty seconds to introduce themselves and present their position. The rest of the class will silently score each position statement according to criteria such as clarity, self-consistency,

factual content, emotional content, and how convincing it was. At the end of the Round Table Town Hall we will execute a vote to gauge the level of total consensus.

This description is a **preview** of the full Round Table Town Hall assignment. You must access the complete assignment document on Canvas and prepare your written position statement using the specific details and guidance contained therein.

Semester Long Project

All students will participate in a semester-long group project (Assigned in Week 11) to answer a question related to the possibility that we are living in a simulation. The instructor will select the focus topic, but each group member is responsible for identifying their question, collecting data, analyzing the data, and answering the question. At the end of the semester all GE CRT SCI 101 courses will participate in a virtual poster day, showing off the results of their projects. Assignments throughout the semester will help build towards the final project. All community members will also be responsible for individual reflections and evaluations of their peers.

Course Expectations, Policies, and Student Behavior Requirements

- **Canvas:** Canvas will be the primary mode of communication for the course.
- **Attendance:** Managed via the participation grade component and the UMKC Attendance App.
- **Final Exam Make-up Policy:** The final exam is given during the assigned time slot during finals week. There are no make-ups.
- **Late Work:**
 - An assignment that is submitted late will be automatically reduced in score by **10% per day**.
 - Late work is not accepted for the following course assignments: Elevator Pitch, Town Hall, and Signature Project Assignment.
- **Behavior:** Students are expected to be supportive of a good learning environment and to adhere to the [University of Missouri Collected Rules and Regulations for Student Conduct](#). Discussion between students is strongly encouraged for all course assignments. However, students are forbidden from doing someone else's work for them either directly or indirectly. In brief, when it comes to supporting and enriching each other's learning experience: If your behavior feels wrong or unethical then it probably is, so don't do it. If your behavior feels right or ethical then it probably is, so you should do it. If there is a question, then ask me! I will not get mad. I will help.
- **Summary:**
 - Bring your intellectual A-game to class every time.
 - Follow the Platinum Rule: Do unto others as they would have you do unto them.

Standards for Student Coursework


- **NetLogo assignment quality expectations:**
 - Simulation demonstrates intellectual growth.
 - Simulation is documented following the guidelines in the assignment document.
 - **NetLogo assignment grading procedure:**
 - NetLogo simulations are graded according to a rubric that balances technical and presentation aspects.
- **Elevator Pitch quality expectations:**
 - Technical aspects:
 - Students must submit on time.
 - The Elevator Pitch must be within the designated 120 second length.
 - Spoken audio must at least be understandable aiming toward polished.
 - Video must at least be stable aiming toward stylish.
 - Avoidance of verbal tics (“ahs”, “uhms”, repeated tsk sounds, up-talking (pitch changes at a sentence end when *not* asking a question), etc.)
 - Good eye contact and emotive/expressive speech that supports the content.
 - Content aspects:
 - Responsive to the assigned charge in the Elevator Pitch assignment document.
 - Logical presentation with a personal introduction, a topic introduction, an issue statement, and a call to action. (Follow the guidelines described in the Elevator Pitch assignment document.)
 - Nuanced and not superficial.
 - **Elevator Pitch grading procedure:**
 - Pitches are graded according to a rubric that balances technical and content aspects.
 - Contrarian arguments are welcome if they follow the content expectations.
- **Round Table Town Hall quality expectations:**
 - Written position statement includes technical aspects and content aspects.
 - Submitted written answers are assessment in terms of technical aspects (correct formatting, correct grammar and punctuation, and appropriate length) and content aspects (clear, logical, minimal fluff, nuance and sophistication of response).
 - Technical aspects:
 - Students must submit on time, **before** the Round Table Town Hall.
 - The position statement must be consistent with a 120 second spoken length.
 - Correct formatting, correct grammar, correct punctuation.
 - Content aspects:
 - Responsive to the charge in the Round Table Town Hall assignment document.

- Logical presentation with a personal/role introduction, impact statement for intersection with faculty activities, a reasoned argument for a specific prioritization, and a clear numerical statement of preferred priority.
 - Nuanced, not superficial, and accurately reflecting the assigned role.
 - **Round Table Town Hall grading procedure:**
 - Half of the grade is tied to the written position statement and half of the grade is tied to completion of the analysis worksheet during the Round Table Town Hall event itself.
 - The written position statement must be submitted before the Round Table Town Hall.
 - The analysis worksheet must be submitted in class immediately after the Round Table Town Hall.
 - A rubric is used to grade the written position statement that balances technical aspects and content aspects.
 - The analysis worksheet is graded for completion.
- **Participation expectations/grading:**
 - Students are expected to attend all lecture sessions, attendance will be taken.
 - Students must be present for the whole class to receive a 100% participation score.
 - All students are given four (3) free days that they can use for *any* reason.
- **Reading assignment expectations:**
 - A reading assignment is given in the syllabus for each module.
 - Students are expected to complete reading assignments and to answer assigned questions on in the associated class discussion board **before** the first round of in-class discussions are conducted (on Tuesdays).
 - Each person will submit their own response to the reading question assignment.
 - Students are expected to then review the answers provided by other students **before** the second round of in-class discussions are conducted on the following Thursday.
 - During the Thursday session students will discuss with each other to develop responses to other students' answers.
 - **Reading assignment grading procedure:**
 - A rubric is used to grade the written responses that balances technical aspects and content aspects.
- **Semester Long Project expectations:**
 - At a minimum, the essence of Task 1 of the Signature Assignment is that you must propose to do something, anything, on your own that we have not explicitly done yet

while following the ideals of the scientific method and also staying within the realm of the do-able given the time constraints.

- At a minimum, the essence of Task 2 of the Signature Assignment is that you must implement something novel and wholly your own so that it reflects your attempt to answer either the question you posed in the first stage or a modified, refined version of the original question.
- At a minimum, the essence of Task 3 of the Signature Assignment is that you use your NetLogo simulation to produce any kind of quantitative graph.
- At a minimum, the essence of Task 4 of the Signature Assignment is that you make your simulation understandable and accessible to your fellow students.
- At a minimum, the essence of Task 5 of the Signature Assignment is that you listen to at least two presentations that were made by other students and then provide feedback in the form of constructive criticism.
- **Signature Assignment grading procedure:**
 - A set of reflection questions will be used to assess the Signature Assignment.
 - You will need to submit your answers to the reflection questions and the Signature Assignment itself for assessment purposes.

Other Resources and Policy Statements

- **UMKC Course Policies & Resources:**
 - Important UMKC Resources and Policies are applicable to every course and every student at UMKC. To read the policies, navigate to Canvas (<https://umkc.instructure.com/>), click the *Help* icon (located on the left side of the screen and shown here at the end of this note), and then select 'UMKC Resources and Policy Statements'. As a UMKC student, you are expected to review and abide by these policies. If you have any questions, please contact your instructor for clarification. 
- **Recording Policy:** This course follows the “Faculty not allowing recording” option of the Academic Inquiry, Course Discussion and Privacy policy. University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in Section 200.015 of the Collected Rules and Regulations. In this class, students may not make any audio or video recordings of course activity (including those recordings prepared by an instructor), except students permitted to record as an accommodation under Section 240.040 of the Collected Rules. All other students who record and/or distribute audio or video recordings of class activity are subject to discipline in accordance with provisions of Section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters. Those students who have written permission from the course instructor to record are not permitted to redistribute any audio or video recordings of statements or comments from the course to individuals who are not students in the course without the express permission of the faculty member and of any students who are recorded, including those recordings prepared by an instructor. Students found to have violated this policy are subject to discipline in accordance with provisions of Section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.