

GISAT 160– Critical Thinking

Course Overview

Grades are the Matrix. Their impacts permeate almost all aspects of your life as a student, and like the Matrix, you may not even be aware, except on a subliminal level, of how much power over your life grades really have. This course will be a semester long examination of grades and grading that will touch on topics such as:

- History of Grades
- Philosophy
- Educational Theory
- Assessment and Psychometric Theory
- Motivation
- Positivity
- Self-Discipline

At the same time that we will be reading a variety of literature on the topic this will be very personal exploration focused on you and your beliefs, attitudes, values, and behaviors with respect to learning and grades. It should be an eye-opening experience for everyone! That being said, here is the JMU Catalog description of this course:

Catalog Description

This course examines issues in modern science and technology as a means to introduce, develop and enhance critical thinking and problem solving skills. Current scientific and technological research and applications will be introduced to reinforce problem solving, instruction in systems thinking and critical inquiry. The course provides opportunities for using both oral and written communication in a variety of learning activities.

GISAT 160 offers instruction in problem solving and thinking skills that serve to increase students' current academic skills as well as their professional skills. There are four main topics we cover in class:

1. **Critical Reasoning / Close Reading**

Students study practical critical reasoning skills and methods primarily through the analysis of language in short science and technology articles.

2. **Systems Thinking / Complex Systems**

Systems Thinking is the study of the world as a complex system, in which we understand that "everything is connected to everything else." Complex Systems is the study of the unpredictable results that occur when a variety of simple things interact in complex ways...and their influence on such topics as science, technology, economics, the environment, and virtually every field of human endeavor.

3. **Problem Solving**

Students learn fundamental linear and non-linear problem solving strategies in a variety of contexts. Methods include structured problem solving, brainstorming, writing as thinking, reflection, induction / deduction, listening, and non-argumentative conversation skills.

4. **Problem Solving and Technology**

Instruction focuses on defining the role of technology in generating and exploring ideas in the context of the problem solving process.

GISAT 160 classes are informal and offer students the opportunity to discuss issues relevant to science and technology.

The Professor

My name is Morgan. I grew up in Lynchburg, VA and was an undergrad at the University of Richmond where I studied Sociology and Leadership Studies (with a minor in physics). I lived and taught English to junior high kids in rural northern Japan for 5 years after college. I got married there and had two daughters. In 2001 I moved back to the US with my family and started a PhD in Information Systems at New Jersey Institute of Technology. I came to JMU in 2006 and have been teaching here ever since.

My research mainly involves coming up with pedagogical alternatives that maximize student motivation and learning. Being a tech geek, web-based technology plays a pretty heavy role in what I came up with.

My favorite part of my job is getting to hang out with students and play with technology. Feel free to come see me any time. My info:

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Identify and Evaluate Claims

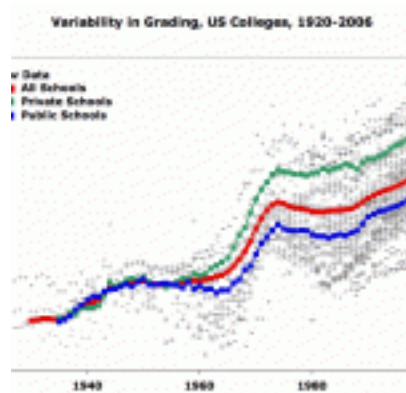
People Say Stuff...Should you believe?

People say stuff all of the time and frequently they express an opinion or state a “fact.” Just because they say it doesn’t mean that it is true or clear. One of the most important elements of critical thinking is the ability to identify and evaluate the claims people make for:

- Clarity
- Credibility
- Reliability and Accuracy

The four objectives in this area involve developing your ability to identify claims and then evaluate the clarity, credibility, reliability and accuracy of the claims that people make.

Evaluate Claim Clarity



Good critical thinkers are able to evaluate the clarity of the claims that they and others make. People claim things all the time, but some times it is not really clear what they are trying to say. For example, Stuart Rojstaczer created a website dedicated to the issue of “[grade inflation](#).” He provides a great deal of data, and some colorful graphs illustrating trends in grading at universities in the US. At one point, about mid-way through his site he says:

When people say that grade inflation is a problem too difficult to solve, I have to disagree.

Although it is fairly clear from the manner of presentation and tone of the site that he believes that “grade inflation” exists, and it is also clear that he believes that it is a problem, he never

really actually explains *why* it is a problem. He seems to assume that this point is obvious and makes no attempt to explain why the trend he describes is somehow bad.

Unfortunately, this is pretty bad form for a “critical thinker.”

It is important that other people understand what you mean when you say things. It is important that you understand what other people mean when they say things. Unless you develop the ability to evaluate the clarity of the claims made by yourself and others, miscommunication, misdirection, and meaningless arguments are bound to ensue.

Why Learn This?

Good things that can happen if you know how to evaluate clarity of an argument:

- You will spot early when people are being unclear (including yourself)
- You can have more honest and productive communication
- You will avoid meaningless arguments
- You will avoid being fooled or misdirected
- You will be better able to make a clear argument yourself

On the other hand, bad things can happen if you can't tell when someone is being unclear:

5. You may be convinced that something is a problem when it isn't
6. You may be confused by the arguments a person is making
7. You may not understand why you, yourself, are making an argument
8. You may not realize why people are confused by what you say

In short, if you seek to be an effective communicator and argue effectively for the things you want to see happen, learning to be clear is an essential skill. Also, if you wish not to be fooled or misdirected by others, you should work to be able to spot unclear claims.

Ways to Show Mastery

To demonstrate mastery of this objective you'll actually have to evaluate the claims that people make. You can find them in many places, such as:

1. Readings assigned in this class or another class
2. Other academic articles, books, or readings
3. Political ads, newspapers, other publications that express opinions or try to persuade readers of something
4. Your classmates' writings
5. Your own writing that you are doing now or have done in the past

Once you locate these claims, you can write up an analysis that answers these questions:

1. What claim(s) do you think the author is making?
2. Is the claim stated explicitly or is it implied?
3. Is it clear? Back up your position with a good argument.

When you write up your analyses you can post them as blog posts or journal entries on this site, or you could include them as part of a longer analysis associated with your work toward mastering other objectives related to claims.

Weekly Rhythm

The single most important thing you can do to succeed in this class is to dedicate time each week to learning the material. In order to help you do that our week will follow a very regular rhythm.

Our days will be spent as follows:

- **Friday's Class—Climbing the High Dive**

On Fridays we will introduce new concepts and set goals and tasks for the upcoming

week by writing an assignment together.

- **The Weekend–Diving In**

Over the weekend is your time to read the books, watch online videos and tutorials, meet with your team, and to get started working on the assignment we wrote on Friday.

- **Monday’s Class–Coming Up for Air**

Monday’s class will be largely unstructured Q&A time. You should come to class prepared with questions you want to ask about things you started over the weekend. Your team should be there on time and ready to hit the ground running.

- **Monday Night Hacking–Diving Deeper**

Every Monday night from 8pm-Midnight the lab will be open and your professor will be present to work with you in a longer, more relaxed setting. This is a great time to spend several hours of focused, uninterrupted work with your team, or by yourself.

- **Wednesday’s Class–Drying Off**

The assignment from Friday is due every Wednesday at class time. We will go over the assignments together in review sessions. Usually one team will present their week’s work and receive feedback from everyone in the class.

- **Wednesday Night–Reflection**

One of the most important elements of success is reflecting on your experiences. Every Wednesday night you’ll have a self-evaluation exercise and possibly a peer-evaluation exercise to complete. You’ll rate yourself, your classmates, and your instructor on their performance for the week.

- **Thursday–Heading Back to the Board**

On Thursdays we’ll look back on the week and take stock of how far we’ve come and where we want to go in preparation for our new task on Friday. The cycle is complete. Time to start again!

How much time will this class take per week?

A good rule of thumb is that you should be spending **at least 10 hours per week** per 3-credit course. That includes class time. If you find you like this stuff, though, it will be very easy to spend a lot more time on it. You’ll have an opportunity to report the amount of time you’re spending during your weekly self-reflection. A good strategy for success is to set up

a weekly calendar in which you set times when you will work on 252-related tasks each week including meeting with your team.

Texts & Resources

We will read several books together:

- Fredrickson, B. (2009) *Positivity: Top-Notch Research Reveals the 3-to-1 Ratio That Will Change Your Life*. Three Rivers Press 9780307393746
- Baumeister, R. F., Tierney, J. (2011) *Willpower: Rediscovering the Greatest Human Strength*, Penguin Press, New York. 9781594203077
- Kohn, A. (1999) *Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A's, Praise, and other Bribes*. Houghton Mifflin 9780618001811

All three of them have prompted dramatic changes in my life and I hope you'll find them as incredible as I have. There will also be a number of shorter readings this semester, starting with:

- An excerpt from Arum, B., and Roksa, J. (2010) *Academically Adrift: Limited Learning on College Campuses*, University of Chicago Press, 272pp (of course you're encouraged to get and read the whole book, if the excerpt excites you!)

Also, please be aware of the [JMU Learning Centers](#), where you can get free tutoring in writing, science, math, and communication. Taking advantage of these services is very intelligent and is something that was invaluable to me when I was an undergrad. Particularly since this will be a writing and reading intensive course, it would be a great idea to take advantage of the opportunity to have an experienced pro help you with your work.

Personal Integrity

First:

If I catch you cheating, or doing anything else dishonest, you will fail the course. Period.

Second, that being said, *I strongly encourage sharing and collaboration in most every aspect of the course*. You'll note that many "sharing" behaviors would be considered "cheating" in many or most other courses. Here are some guidelines I'd like you to follow:

- **Never EVER copy without attribution**

Even on tests, if someone or something helped you out, acknowledge it. Make notes in your writing if you got it from someone or somewhere else. Copying without attribution is stealing and is a breach of integrity. If you got an argument off of the web, there should be a URL and some notes about how you found it. If you paid someone to help you write it, say so.

- **Never copy without understanding**

The point of the class is to learn and understand stuff. Since you don't get any grades on individual tests or assignments, it's pretty stupid to copy something that you don't understand. Think about it. What point could it possibly serve?

Okay, so what do I consider a breach of integrity worthy of failure?

- **Lying about anything to anyone in the class**

It could be as trivial as the reason why you didn't show up for class or do your part

of a group assignment. Everybody screws up sometimes. Don't compound the mistake by lying about it. We can forgive mistakes but it's VERY difficult to regain trust once it's broken. Swallow your embarrassment or fear and fess up.

- **Stealing anything–this includes copying without attribution**

Stealing is just wrong, and there's no reason not to give people credit for the work they did. Passing someone else's original work off as your own is frankly disgusting.

- **Threatening, antagonizing, or intimidating anyone in our learning community**

This is unacceptable behavior and will get you at least fired, if not sued in most every company you'd ever work for.

If you are in doubt about something, please ask your prof. Please feel free to come speak to your prof in confidence about anything in this course that troubles you. So far at JMU I've never had a problem with anyone's integrity (that I know about). Don't be the first group to ruin my perfect record. Thanks!

Grades and Evaluation

A Revolution in Education:

We take grades and the grading system for granted. [Watch this talk by Sir Ken Robinson.](#)

Simply Put: Grades Undermine Learning

The evidence to support this claim is ample, robust and has been growing for the past 40 years (cf. [2001–Deci, Koestner & Ryan–Extrinsic Rewards Reconsidered](#)). While it's possible to use grades in a way that minimizes their negative influence on learning, rather than jump through those hoops, your instructor has decided to do away with them altogether. It's simpler, less work, and causes

much less stress for everyone involved with the process. Incidentally, it's also a much more effective way to foster learning.

"Yeah, but grades motivate me to study!"

Yes, that's exactly the problem. They aren't really doing what you think they're doing. [Check out this point illustrated in *The Office*](#)

If you are genuinely interested in learning the material in this course, why do you need grades to motivate you? And if you aren't interested in the material covered in this course, why are you here? I mean really! Why would you pay money to do something you don't want to do?

I, your instructor, don't have any desire whatsoever to force feed this material down your throat. I love the material and I do this job because I truly love sharing my passion with others. I can be a good guide to you but I have no interest in dragging you along against your will. What does either of us gain by that? If you still don't know yet, whether or not you like this stuff, I'm also happy to engage with you to help figure out the answer to that question. If you give the material an honest effort and find you still don't like it, that, in my opinion, is a valuable use of both your time and mine.

"Sure, but employers want people with good grades..."

Maybe not. **Research shows that recruiters frequently ignore GPAs or even select against people with high GPAs.** Employers want independent problem solvers who know how to create and deploy technology effectively. They want people who know the difference between good work and crap. People who can figure out for themselves how to achieve desired outcomes. Why in the world would a potential employer care about the letter grade on a transcript if you've got a resumé chock full of real live software projects that you've completed? Even though grades are designed to be a proxy for showing what you can do, they are never as good as the real thing. Take advantage of your time in this class to build skills and products that will adequately show what you can do.

"Okay, but at least the registrar wants a grade. What will you tell them?"

Whatever you want me to (within reason). JMU doesn't force me to follow any

sort of grading distribution or curve. JMU doesn't charge me \$100 per A, \$50 per B, \$25 per C and so on. It has little impact on me whatsoever if I give all A's or all F's. Personally, I think you should give yourself an honest grade that reflects what you can do. I'm more than happy to help you arrive at that determination. At the end of the semester you and I will have a one-on-one meeting in which we discuss everything you've done this semester and figure out together what to tell the registrar.

That doesn't really sound fair...

Fair to whom? Concepts of fairness only really come into play in the context of a competition between people over scarce resources. We've already established that there's nothing scarce about the supply of A's in the world. The only competition in which there's a potential for unfairness is in competitions for things like jobs, internships, admission to graduate school, and scholarships. The truth is that none of these competitions are really fair anyway. Furthermore, my way of distributing grades is, while unorthodox, no less valid than anyone else's method. For an accessible discussion on the validity of grades I refer you to [**Alfie Kohn's 2002 article on grade inflation in the Chronicle of Higher Ed**](#). When you really dig into the dank underbelly of how grades are distributed, you're going to find that most of us faculty are just making it up as we go along anyway. Rather than bicker with you over something about which I don't care, my choice is just to let you choose for yourself what you want. Instead, I'll spend my time sharing really juicy content with you, and trying to find out what makes you tick.

Alright already, so if there are no grades, how will I know if I'm doing well or not?

Now we're talking.

The whole point of my approach is to make you forget about grades altogether and instead focus on learning how to embrace computational thinking in your life. So, let me try to use some web media to help shed some light on this rather unorthodox approach. The first question is, what should we be studying? [Watch this quick video](#)

Okay, so this video is guilty of a bit of hyperbole, a little out of date, and should be taken with a grain of salt, but in my mind here's the money quote:

We are currently preparing students for jobs that don't yet exist, using technologies that haven't been invented, in order to solve problems we don't even know are problems.

This goes double in a programming class. I've been programming for 10 over years now, and I've seen the state of technology and the practices of development change completely several times within that time frame. What that means is that we have to have a sense of humor about the content on the syllabus. Although the topics serve as an interesting framework around which we can spend our time together, it would be somewhat naïve of us to really believe that knowing how to do any of the things there is really going to serve us well for more than three or four years.

As such, I believe that a practical and rational set of goals for you to have when you take this course are:

- Figure out if you really like programming
- Figure out what your strengths and weaknesses are in this area

If it turns out that you love doing this and are also likely to be good at it, you may be in what Sir Ken Robinson calls your Element. I think all of your "higher education" should be about finding your element. But don't let me convince you, [have a listen to Sir Ken](#):

So, if you take what Sir Ken says seriously (and I do), here's what I think it means for us in this class. There are three areas in which your work in programming might be evaluated:

- **Did you enjoy ?**

I don't think you need my help in figuring out whether or not you like this stuff. You should be able to evaluate that for yourself.

- **Is it effective?**

Good programs, at least at the surface level, should be relatively easy for you to

recognize without my help. I mean, a piece of software is effective, or it isn't. Although we'll talk about this some, I generally expect that you can decide this for yourself as well. I can give you pointers in how to develop a better sense for aesthetics in your own creations.

- **Is it technically sound?**

Under the surface however, there are some technical aspects of software quality that may only be apparent to a trained eye. I don't expect you to know anything about these aspects and that's where I can bring the greatest amount of my own expertise to bear in this class. This is where I see my efforts as having the greatest impact. My goal is to train you to be able to evaluate the technical aspects of software on your own.

At the end of the day, the responsibility for determining the quality of your work is your own and here's why:

If you can't, on your own, tell the difference between high and low quality work, then you will never ever be able to reliably produce high quality work by yourself because...how would you know?

Lastly, I see my role as your instructor as a guide and cheerleader to help you find your passion. Actually, I really see myself as more like your personal trainer. So what do I mean by that?

- You have hired me to help you get stronger at software development
- I can show you what exercises to do, but you are the one who has to put in the time and do the heavy lifting
- I still get paid, regardless of what you do, so why not get your money's worth?

I really love this stuff, so why not put in everything you've got and get something out of what this class has to offer.

Important Dates and Policies

At the behest of the registrar, a list of dates you may wish to take note of:

- Tuesday, September 4th: Last day of add/drop on [MyMadison](#)
- Thursday, September 13th: Last day to add a class with Instructor and Department Head signature
- Thursday, October 25th: Last day to withdraw from course via [MyMadison](#) without instructor involvement

So if I scare you off, get out early. Or conversely, if I turn you on, join us soon!

[My academic integrity policy](#) is different from JMU's standard policy, but I will adhere to JMU's standard policies listed on the [JMU Syllabus Information for Students page](#) with respect to add/drop, disability accommodations, inclement weather and religious accommodations.