

Department: Science, Technology, and Society
Scientific Thinking | STS330-004 | Credits: 3

Prerequisites/Corequisites: Junior Status and any Natural Science w/ Lab course

Meeting Days, Times, and Location: Tuesdays and Thursdays, 4:30-5:45 pm, Gleeson Hall 123

Type of Instruction: In person/lecture

Dr. Emma Stamm

Email address: stamme@farmingdale.edu

Office location: Memorial 114

Office hours: Wednesdays 3-4 pm online; Thursdays 6:15-7:15 pm online and in person (Memorial 114)

Other contact information: Please contact professor from your Farmingdale email account

General Education status: Not a General Education course

Catalog Course Description:

In this course, students will be introduced to a method of problem solving characterized by critical thinking across multiple disciplines. Students will revisit the scientific method to learn how to employ its tenets to approach unstructured, real-world problems faced on the individual, local, and global levels. Students will be introduced to the concept of integrative thinking and how to draw on the multidisciplinary nature of STS to substantively interact with complex issues. In the process, students will gain familiarity with the methods in which data science may be employed to approach problem solving. As the semester progresses, students will apply the skill set this course cultivates to analyze and evaluate problems as well as synthesize solutions.

Course Learning Outcomes:

By the end of this course students will be able to:

- Solve unstructured real-world problems using the scientific method
- Identify connections across separate fields, utilizing integrative thinking that draws from multiple disciplines
- Apply the STS skill set to analyze issues of great impact to the modern professional environment
- Analyze data develop solutions to problems
- Evaluate the impact of data science on various forms of research
- Contrast scientific and integrative thinking with nonscientific and non-integrative approaches
- Consistent with the aims of STS, students will enhance their ability to situate technoscientific phenomena in social and cultural contexts

General Course Requirements

No books or other materials are required for purchase.

The course comprises a weekly lecture and interactive discussion as well as a weekly activity where students will work in groups to participate in guided interaction with the concepts introduced in the lecture. Additionally, students will use their skill set to develop a project where they analyze, evaluate and present on a real world, complex, interdisciplinary subject. Participation will be continually assessed for quality and substance throughout the meetings. Students will be expected to prepare for classes by reading and/or viewing the required material on the weekly schedule. Students must be prepared to actively participate in class discussions and exercises.

Grading in this class:

- Participation (including attendance): 20%
- Quizzes (3): 10% each; 30% total.
- Semester project: 30% total. This is divided across three parts: proposal (5%); presentation (10%); write-up (15%)
- Final exam: 20%

Grading System (from 2023-2024 Course Catalog)

- 93.0: A / GPA: 4.0
- 90.0: A- / GPA: 3.67
- 87.0: B+ / GPA: 3.33
- 83.0: B / GPA 3.0
- 80.0: B- / GPA: 2.67
- 77.0: C+
- 73.0: C / GPA: 2.00
- 70.0: C- / GPA: 1.67
- 67.0: D+ / GPA: 1.33
- 60.0: D / GPA 1.00
- 0: F

Week-by-week outline.

While the outline is unlikely to change significantly, there may be minor adjustments for extenuating circumstances.

Date	Topic	Student Learning Outcomes
Week 1	Introduction: Scientific Thinking and STS	Define and connect the concepts of empiricism, rationality, and skepticism; explain how STS scholars approach these as both ideals of scholarship and objects of critical investigation
Week 2	Positivism and predictive power	Define and connect the concepts of positivism and predictive power; situate them in historical context; connect them with concepts from Week 1; develop original perspectives on notions of accurate knowledge prevalent before, during, and after the Scientific Revolution

Week 3	Hypothesis tests and variables in experiments	Define and connect the concepts of falsifiability and testability; explain the role of dependent and independent variables in hypothesis generation; explain basic principles of statistics as they apply to hypothesis testing
Week 4	Case study: observational research in psychology	Differentiate between laboratory studies and field studies; apply concepts from preceding weeks to analyze a case study in psychology research; begin to develop final project ideas
Week 5	Demarcation and pseudoscience	Define “the demarcation problem” and identify examples from real-world cases; identify characteristics of pseudoscientific claims; distinguish pseudoscience from non-science; use concepts from weeks 1-5 for the purpose of disambiguating science, non-science, and pseudoscience
Week 6	Intellectual populism and science denialism	Define the concepts of “intellectual populism” and “science denialism”; apply these concepts to explain popularity of pseudoscience and rejection of expertise; evaluate arguments from STS scholars that explain these phenomena
Week 7	Big data and data science: are they revolutionary?	Define big data and situate in social/historical context; distinguish correlation from causation; define data science; define induction; apply STS scholarship to evaluate the promises and hazards of data science

Week 9 (Week 8 is spring break)	Experimentation vs. predictive modeling	Explain difference between experimentation and data modeling; define induction; assess the impact of big data on construction of predictive models
Week 10	Randomized controlled trials	Define “randomized controlled trial”; distinguish between RCTs and other types of research; apply concepts from preceding weeks to explain why randomization and blinding are necessary in most scientific studies on human subjects and/or construct original arguments for and against practices characteristic of RCTs
Week 11	Placebos	Define “placebo” and “placebo effect”; define “priming”; explain the rationale for using placebos in clinical trials;; define “open label placebo”; evaluate the role of placebo effects on conditions that may be impacted by priming
Week 12	Documentary screening	Watch and critically assess documentary content pertaining to material from recent weeks
Week 13	Scientific research funding	Explain the contextual factors that may impact scientific research funding; construct original arguments regarding the impact of such factors on scientific research; propose best practices in research funding that affirm and/or diverge from contemporary trends; begin final exam review
Week 14	Semester review; applied learning activities; project presentations and discussions	Review emphasizing applied learning activities; third quiz; student project presentations

Week 15	Semester review; project presentations and discussions	Final exam review; student project presentations
Week 16	Final exam	Final exam administered in class

Cancellation of Classes:

Weather and other campus-wide cancellations will be listed on the home page, Facebook and Twitter and you can also sign up for RAVE and SUNY Alert. Go to www.getrave.com and use your Farmingdale user ID and password to enter the site. For SUNY-Alert, please visit the University Police web page at www.farmingdale.edu/university-police/.

In the event of class cancellation, students will be notified via email announcement as soon as possible.

Electronic Devices Policy:

As computers (laptops, desktop computers, and tablets) will be required for certain activities, they may be used in class. You may only use these devices for class-related activities.

Cell phone use is strictly prohibited! The first two times you're seen using a cell phone will count as "strikes." For each incident thereafter, half a point will be deducted from your participation grade. In the interest of transparency, you will be informed quickly and privately (via email) when you receive a "strike" or, following two strikes, a half-point deduction for in-class cell phone use. Note that each session will include a brief break (3-5 minutes) where you're welcome to use your phones.

Attendance Policy:

Attendance will be taken at the start of every class. Students are expected to participate in class discussions and activities throughout the semester, and unexcused absences from class will be deducted from the participation grade.

Regarding impact on the final grade: two absences will be excused without further explanation, i.e., you have two freebies. After that, each unexcused absence will result in one point deducted from your participation grade.

I do my best to be as understanding about attendance as possible. With that said, it is impossible to succeed in the course if you're frequently absent. What happens in our live sessions is essential. It can't be replicated.

Whenever possible, it is advisable to provide documentation (such as a medical note) explaining absences. I know that it's not always possible to obtain documentation, so in some cases, I may excuse absences without it. Communication with me is what matters most -- indications that the course is on your mind, and that you take it seriously.

If you miss class:

Please obtain notes from a fellow student and review the slides when they are posted.

Religious Absences:

If you are unable to attend class on certain days due to religious beliefs, please consult with me well in advance of the absence so that appropriate accommodation can be made.

Late work:

Assignments are marked down to the next grade tier per day late. E.g., an A- turns into a B+; a B+ into a B; and so on. Again, I will make exceptions for substantial extenuating circumstances.

If you miss a quiz, email me ASAP and we will determine another arrangement.

Use of Email:

Please use instructor email (stamme@farmingdale.edu) to communicate outside of class time. Between Monday and Friday, messages will generally receive a reply within one day. Messages sent over the weekend and on breaks will generally receive a reply within one day of the school week resuming.

Copyright Statement:

Course material accessed from Brightspace or the Farmingdale website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder, is a violation of the Federal copyright law, as well as a violation of SUNY copyright policy.

Disability Services Center:

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Disability Services Center, Roosevelt Hall, Room 151, or call 934-420-2411, or 420-2607 as soon as possible this semester.

Academic Integrity Policy:

Because intellectual honesty is a cornerstone of all academic and scholarly work, each member of the Farmingdale State College campus community is expected to maintain academic integrity. Farmingdale State College has developed regulations concerning academic dishonesty and integrity to protect all students and to maintain an ethical academic environment. For more information, click the updated link below:

http://www.farmingdale.edu/academics/pdf/acad_integrity_policy_0517.pdf

It is important for you to understand the concept of plagiarism. Plagiarism entails the representation of words, images and/or ideas of another as one's own in any academic exercise. This includes material in either print or electronic format.

Students shown to have intentionally plagiarized work on any given assignment will fail the assignment. This includes the use of generative AI programs (such as ChatGPT or Dall-E) to produce work without proper acknowledgment. It additionally includes self-plagiarism, which is the practice of using work that one has already created for a purpose other than that of the given assignment (such as turning in writing from a class previously taken as a writing assignment for the present course). Depending on severity (determined by the instructor), cases of intentional plagiarism may be reported to the Dean of Students.

Plagiarism may also happen unintentionally. Here is a good primer on unintentional plagiarism: [link](#). Students are expected to take all precautions necessary to avoid this. The consequences of unintentional plagiarism will be determined based on severity.

Student Code of Conduct

The President of the College and the Vice President for Student Affairs recognize the rights of designees including University Police, to enforce all regulations, policies, license agreements, laws and codes on campus. If any individual allegedly violates the laws, Student Code of Conduct or campus policies, a President's designee will institute proceedings against the offender (s). For more information on the student code of conduct, see the Code of Conduct section in the current Student Handbook which can be found at this link, or choose Code of Conduct from the A-Z Links. <http://www.farmingdale.edu/campus-life/dean/student-handbook.shtml>

University Police

934-420-2111