

Spring 2020 Information Sciences 590 Section 004

Problems: Information Sciences

Data Management

The School of Information Sciences

The University of Tennessee

Class Meetings via Zoom: Thursday, 6:30 pm – 9:10 pm;

<https://tennessee.zoom.us/j/8012927015> (Links to an external site.)

UTK Syllabus, Provost's Office:

<https://teaching.utk.edu/the-syllabus/> (Links to an external site.)

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Course Description

Many funding agencies require researchers to develop data management plans detailing the aggregation, dissemination, and preservation of their funded research. According to the Committee on Data of the International Council for Science (CODATA) Research Data Alliance (RDA) “research data science” require the ensemble of skills that include (1) principles and practices of Open Science and research data management and curation, including data repositories, (2) the use of a range of data platforms and infrastructures, (3)

large scale analysis, (4) statistics, (5) visualization and modeling techniques, (6) software development and annotation, and (7) more[1]. The funding, managing, and sharing of research data involve multiple stakeholders throughout the data lifecycle. This course introduces the fundamental data management models and socio-technical systems theory[2] to identify, organize, and utilize socio-technical (e.g., people, buildings/infrastructure, technology, culture, processes/procedures, and goals) relationships to enable data management and curation and cyberinfrastructure development through research collaborations.

Course Objectives:

The course will involve teaching through mini-assignments, projects, and active participation. As the need for funded research to be findable, accessible, interoperable, and reusable (FAIR (Links to an external site.)) become increasingly significant across all disciplines, this course seeks to explore the concept of socio-technical data management cyberinfrastructure in the context of researchers developing data management education, support, and training within/across communities of practice.

[1] CODATA. (2018). CODATA-RDA School of Research Data Science. Accessed online from <http://www.codata.org/working-groups/research-data-science-summer-schools> (Links to an external site.).

[2] Leeds University Business School. (2018). Socio-Technical Systems Theory. Accessed online from <https://business.leeds.ac.uk/research-and-innovation/research-centres/stc/socio-technical-systems-theory/> (Links to an external site.).

References:

Davis, M. C., Challenger, R., Jayewardene, D. N. W., & Clegg, C. W. (2014). Advancing socio-technical systems thinking: A call for bravery. *Applied Ergonomics*, 45(2 Part A), 171–180. <https://doi.org/10.1016/j.apergo.2013.02.009> (Links to an external site.)

DCC. (2013). Checklist for a Data Management Plan. v.4.0. Edinburgh: Digital Curation Centre. Available online: <http://www.dcc.ac.uk/resources/data-management-plans> (Links to an external site.)

Pinfield, S., Cox, A. M., & Smith, J. (2014). Research data management and libraries: Relationships, activities, drivers and influences. *PLoS ONE*, 9(12), 1–28. <https://doi.org/10.1371/journal.pone.0114734> (Links to an external site.)

Sansone, S. A., Gonzalez-Beltran, A., Rocca-Serra, P., Alter, G., Grethe, J. S., Xu, H., ... Ohno-Machado, L. (2017). DATS, the data tag suite to enable discoverability of datasets. *Scientific Data*, 4, 1–8. <https://doi.org/10.1038/sdata.2017.59> (Links to an external site.)

Stodden, V., McNutt, M., Bailey, D. H., Deelman, E., Gil, Y., Hanson, B., ... Taufer, M. (2016). Enhancing reproducibility for computational methods. *Science*, 354(6317), 1240–1241. <https://doi.org/10.1126/science.aah6168> (Links to an external site.)

Strasser, C., Cook, R., Michener, W., & Budden, A. (2012). Primer on Data Management: What you always wanted to know. DataONE, 1–11. <https://doi.org/10.5060/D2251G48> (Links to an external site.)

Tenopir, C., Sandusky, R. J., Allard, S., & Birch, B. (2014). Research data management services in academic research libraries and perceptions of librarians. *Library and Information Science Research*, 36(2), 84–90. <https://doi.org/10.1016/j.lisr.2013.11.003> (Links to an external site.)

Wilkinson, M. D., Dumontier, M., Aalbersberg, Ij. J., Appleton, G., Axton, M., Baak, A., ... Mons, B. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific Data*, 3, 160018. <https://doi.org/10.1038/sdata.2016.18> (Links to an external site.)

Wilson, G., Aruliah, D. A., Brown, C. T., Chue Hong, N. P., Davis, M., Guy, R. T., ... Wilson, P. (2014). Best Practices for Scientific Computing. *PLoS Biology*, 12(1). <https://doi.org/10.1371/journal.pbio.1001745> (Links to an external site.)

Additional Information

Students will create researcher's ID such as Open Researcher Contributor ID ([ORCID \(Links to an external site.\)](#)) for use in the development of a data management plan (DMP) using the [DMPToo \(Links to an external site.\)](#). Students will test depositing data or their DMP into a data repository such as [Zenodo \(Links to an external site.\)](#). Students will explore development of a research project using the Open Science Framework ([OSF \(Links to an external site.\)](#)). Research-DATAMAN Home Page list serve (<https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=RESEARCH-DATAMAN>) ([Links to an external site.](#)) and code4lib (<https://code4lib.org/>) ([Links to an external site.](#)).

Student Outcomes:

Students who complete this course will be capable of demonstrating awareness, knowledge, and/or understanding of:

- reviewing data management best practices, guidelines, and models
- developing a data management plan
- introducing socio-technical systems thinking for research data management

Course Design

The course adopts an active learning approach. Students are required to complete all required assignments, attend all class lectures, complete graded activities and assignments, and participate in all class activities, including teacher-led and student-led discussions, and small-group and individual activities. All required assignments are listed in the **Course**

Outline section of this syllabus. Additional resources are also provided. While not required, you may find additional resources useful when completing assignments.

Required Texts:

There is no required text.

APA Style is the recommended writing style.

Communication

The instructor will communicate with the class in advance if any of the dates need to be changed to accommodate unforeseen circumstances. I am required to communicate with you through your UTK email address. If you prefer to use another address, consult the [OIT Helpdesk \(Links to an external site.\)](#) to obtain directions for forwarding your UTK mail to your preferred address if you don't wish to check both accounts.

Computing Requirements

Assignments can be completed from a laptop, workstation, or mobile device without specific software and only require a web browser. It is recommended to use computing resources with a stable Internet connection for the completion and submission of assignments. You must have adequate computing skills and a willingness to learn, including but not limited to use of word processing, Web browsers, e-mail, listservs, Canvas, and Zoom software. You must learn how to submit your assignments using Canvas. The [Office of Information Technology \(OIT\) \(Links to an external site.\)](#) provides training classes in using varied technologies for students at no charge (advance registration is required).

You must obtain a UT email account and subscribe to the SIS student listserv. In addition, you must have the PowerPoint Reader or the regular PowerPoint software installed on your computer in order to download the lecture notes from Canvas.

Class Attendance Policy

Class attendance is expected. Excused absences are consistent with university policies under the current catalog: (<https://onestop.utk.edu/academic-policies/> (Links to an external site.)) and require appropriate documentation. Class attendance affects participation which affects your grade. Oftentimes, comments, discussions, and feedback in class can contribute to addition ideas that enhance your learning within the course. It is assumed that each student be present and speak in class -- the equivalent of a "B" grade for "participation." Missing more classes or failing to participate will lower your grade; frequent participation will raise the grade.

Regular attendance is required and necessary. A substantial portion of your grade will be based on in-class work and participation. Unexplained absences will affect your grade.

Contact me as soon as possible if you cannot attend class. If you will be absent from class, you must:

- Inform me in advance or as soon as possible after class
- Submit any work due from the missed class period
- Listen to class recording
- Obtain notes, handouts, etc. from Canvas
- Check with classmates for notes, announcements, etc.

Acceptable reasons for absence from class include:

- Illness
- Serious family emergencies,
- Special curricular or job requirements (e.g., judging trips, field trips, professional conferences),
- Military obligation,
- Severe weather conditions,
- Religious holidays
- Participation in official university activities such as music performances, athletic competition or debate
- Obligations for court imposed legal obligations (i.e., jury duty, subpoena)

Missing more than one class meeting for reasons other than those listed above will have a negative impact on your course participation grade. If you are unable to attend class, then please inform the instructor.

Inclement Weather

“The chancellor (or appointed representative) may officially close or suspend selected activities of the university because of extreme weather conditions. When a decision to close is made, information is distributed to the campus community, shared with local media, and posted on the front page at <http://utk.edu> (Links to an external site.). (Hilltopics, p. 55)(<http://hilltopics.utk.edu/files/Hilltopics%202015-16.pdf> (Links to an external site.)). SIS will cancel classes when UT is closed. Please check the SIS student listserv (UTKSIS-L@LISTSERV.UTK.EDU) for messages about closing.

Accommodations for Students with Disabilities

Students who may need course adaptations because of a disability are welcome to make an appointment to speak with me. Students with disabilities must register with the [Student Disability Services \(Links to an external site.\)](#), 2227 Dunford Hall, Knoxville, TN 37996-4020, before accommodations can be made. If you require course accommodations but have not

contacted Student Disability Services, please call (865) 974-6087 or email sds@utk.edu to inquire about the registration procedure.

Civility

Civility is genuine respect and regard for others: politeness, consideration, tact, good manners, graciousness, cordiality, affability, amiability and courteousness. Civility enhances academic freedom and integrity, and is a prerequisite to the free exchange of ideas and knowledge in the learning community. Our community consists of students, faculty, staff, alumni, and campus visitors. Community members affect each other's well-being and have a shared interest in creating and sustaining an environment where all community members and their points of view are valued and respected. Affirming the value of each member of the university community, the campus asks that all its members adhere to the principles of civility and community adopted by the campus: <http://civility.utk.edu/> ([Links to an external site.](#)).

CCI Diversity Statement

The College of Communication and Information recognizes that a college diverse in its people, curricula, scholarship, research, and creative activities expands opportunities for intellectual inquiry and engagement, helps students develop critical thinking skills, and prepares students for social and civic responsibilities. All members of the College benefit from diversity and the quality of learning, research, scholarship and creative activities is enhanced by a climate of inclusion, understanding and appreciation of differences and the full range of human experience. As a result, the College is committed to diversity and equal opportunity and it recognizes that it must represent the diversity inherent in American society. The College is acutely aware that diversity and fairness are foundations that unite the College's faculty, staff, students, and the larger communication and information community.

Instructor Status as a Title IX Mandatory Reporter

University of Tennessee faculty are committed to supporting our students and upholding gender equity laws as outlined by Title IX. Please be aware that if you choose to confide in a faculty member regarding an issue of sexual misconduct, dating violence, or stalking, we are obligated to inform the University's Title IX Coordinator, who can assist you in connecting with all possible resources both on- and off-campus. If you would like to speak with someone confidentially, the Student Counseling Center (865-974-2196) and the Student Health Center (865-974-3135) are both confidential resources.

For additional resources and information, visit titleix.utk.edu ([Links to an external site.](#)).

Academic Integrity

Students should be familiar and maintain their *Academic Integrity* described in <http://hilltopics.utk.edu/files/Hilltopics%202015-16.pdf> (Links to an external site.) , p. 15 as: “*Study, preparation and presentation should involve at all times the student’s own work, unless it has been clearly specified that work is to be a team effort. Academic honesty requires that the student present his or her own work in all academic projects, including tests, papers, homework, and class presentation. When incorporating the work of other scholars and writers into a project, the student must accurately cite the source of that work.*”

Students should abide by the ***Honor Statement*** described in the same Hilltopics, p. 73:

“An essential feature of The University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.”

Plagiarism

You are expected properly cite or reference works in which you adapt, derive, or paraphrase as part of your work. Failure to properly cite or reference the works of others that comprise part of your work is grounds for plagiarism. Plagiarism in any of its several forms is intolerable, and attention to matters of documentation in all written work is expected and required. Inadvertence, alleged lack of understanding, or avowed ignorance of the various types of plagiarism are not acceptable excuses.

Specific examples of plagiarism are:

1. Copying without proper documentation (quotation marks and a citation) written or spoken words, phrases, or sentences from any source;
2. Summarizing without proper documentation (usually a citation) ideas from another source (unless such information is recognized as common knowledge);
3. Borrowing facts, statistics, graphs, pictorial representations, or phrases without acknowledging the source (unless such information is recognized as common knowledge);
4. Collaborating on a graded assignment without the instructor’s approval;
5. Submitting work, either in whole or in part, created by a professional service and used without attribution (e.g., paper, speech, bibliography, or photograph).

Students who may be unsure of the nature of plagiarism should consult the instructor or a guide for writing research reports. (Additional resources are available at <http://www.lib.utk.edu/instruction/plagiarism> (Links to an external site.).)

Infractions of academic integrity are penalized according to the severity of the infraction but **may include a course grade of "F."**

Assignments and Grading

Course letter grades will be determined at the end of the semester, based, in part on the comprehensiveness of the projects, assignments, and contributions. Student work is assigned a grade based on quality of thought and writing style, thoroughness of research and of references, appropriateness of length, and originality. Only exceptional work will receive an "A" grade. Papers that are received after the due date will be assigned a lower grade than would otherwise be received. All sources must be cited, quotations must be in quotation marks and attributed correctly. Not doing so constitutes plagiarism.

Preparation of Written Work

- I prefer that you use either APA or CMS documentation styles.
- All sources must be cited, quotations must be formatted and attributed correctly. Not doing so constitutes plagiarism.
- Grades for assignment submissions that include incomplete in-text citations or reference lists will be lowered by one-half grade level (e.g., an assignment that would have received 17/20, or an 85/100: B, will be lowered to 16/20, 80/100: B-). All assignments must be word-processed and **include your name**, date, and class number (003).

Due Dates and Late Assignments

Make up assignments/grading will not be provided. In case of an absence, students will have the option to complete a bonus topic assignment for any missed assignments. Assignments should be submitted to the "assignments" area of Canvas and are due (officially) at 11:59 p.m. EST on the due date listed on the syllabus. I will download the submissions from Canvas early the next morning. **I will ONLY download assignments from Canvas ONCE.** Therefore, if your assignment is not ready by the deadline...

- You must send me an email informing me that your assignment will be late. **Not doing so will result in a one-point deduction for each day I don't hear from you.**
- When it's ready, you must submit it to me via email, as an attachment
- One point will be deducted for each 24-hour hour period the assignment is not turned in.

Incompletes

Based on adopted University of Tennessee-Knoxville and SIS policy, a grade of *I*(Incomplete) is reserved for emergencies that prevent the student from completing the course on time. Incompletes are granted only under "the most unusual of circumstances" and solely at the discretion of the instructor. Plan your semester's course of study carefully to insure sufficient time to complete the required work.

For students who simply "disappear" without contacting the instructor and without completing the required form, an "F" is submitted.

Assigning Grades

Grading will be a combination of individual and group assignments. Please note that I do not assign letter grades for individual assignments, but will mark your paper with my comments and provide a point score based on the possible points earned for that assignment. If you'd like to compute a letter grade based on the score provided, divide your score by the total points possible for the assignment and refer to the scale on pg. 7 of the syllabus for the corresponding letter grade. For example, if you earned 23/25 points on an assignment, your percentage grade would be 92. Your final grade will be based on total points earned/total possible points over the course of the semester.

Evaluation

Describe grading procedures, e.g. Grades will be determined by total points earned divided by total possible points over the course of the semester. Students will have the option to earn 10 bonus points to cover missed assignments and/or raise final grade. The following point scale is used.

+Semester grades will be assigned according to the following scale:

- A 93≤ (4 quality points per semester hour) superior performance.
- A- 90-92.99 (3.7 quality points per semester credit hour) intermediate grade performance.
- B+ 88-89.99 (3.5 quality points per semester hour) better than satisfactory performance.
- B 83-87.99 (3 quality points per semester hour) satisfactory performance.
- B- 80-82.99 (2.7 quality points per semester credit hour) intermediate grade performance.
- C+ 78-79.99 (2.5 quality points per semester hour) less than satisfactory performance.

- C 70- (2 quality points per semester hour) performance well below the standard expected
77.99 of graduate students.
- D 60- (1 quality point per semester hour) clearly unsatisfactory performance and cannot
69.99 be used to satisfy degree requirements.
- F 59.99 \geq (no quality points) extremely unsatisfactory performance and cannot be used to
satisfy degree requirements.
- I (no quality points) a temporary grade indicating that the student has performed
satisfactorily in the course but, due to unforeseen circumstances, has been unable
to finish all requirements. An I is not given to enable a student to do additional
work to raise a deficient grade. The instructor, in consultation with the student,
decides the terms for the removal of the I, including the time limit for removal. If
the I is not removed within one calendar year, the grade will be changed to an F.
The course will not be counted in the cumulative grade point average until a final
grade is assigned. No student may graduate with an I on the record.
- S/NC (carries credit hours, but no quality points) S is equivalent to a grade of B or
better, and NC means no credit earned. A grade of Satisfactory/No Credit is
allowed only where indicated in the course description in the [Graduate
Catalog \(Links to an external site.\)](#). The number of Satisfactory/No Credit courses
in a student's program is limited to one-fourth of the total credit hours required.
- P/NP (carries credit hours, but no quality points) P indicates progress toward completion
of a thesis or dissertation. NP indicates no progress or inadequate progress.
- W (carries no credit hours or quality points) indicates that the student officially
withdrew from the course.

Course Evaluation

You will be invited to evaluate the course at the end of the term. Please participate in this valuable process. I also invite your comments throughout the course and read all comments, suggestions, and recommendations.

Assignments: Description

Include information about specific assignments, including name, due date, and value as part of total grade, as well as the SIS Program Outcome(s) (1-9: <https://www.sis.utk.edu/program/outcomes> (Links to an external site.)) addressed.

*This table identifies the MSIS Program Outcome(s) addressed in course assignment(s):

Assignments	MSIS Program Outcome
Assignments (1 – 10) - https://dataone.org.github.io/Education/ (Links to an external site.)	1
Data Preservation Project - Individual project	1, 6
Open Science Framework Research Project (OSF) - Group project	1
Data Management Plan Project - Individual project	3, 6
Bonus topics (e.g., FAIR data example, Kaggle, reproducibility)	1

This table provides a brief summary of assignment names, due dates, and grade distribution. A fuller description of each assignment follows the table.

Assignment	Value	Due Date
Assignment 1 (Why Data Management (Links to an external site.))	5	1/16/20
Assignment 2 (Data Sharing (Links to an external site.))	5	1/23/20
Assignment 3 (Data Management Planning (Links to an external site.))		
Zenodo sandbox - https://sandbox.zenodo.org/deposit/new?c=insc590_spring2020_sandbox (Links to an external site.)	5	1/30/20
Assignment 4 (Data Entry and Manipulation (Links to an external site.))	5	2/6/20
Assignment 5 (Data Quality Control and Assurance (Links to an external site.))	5	2/13/20
Assignment 6 (Protecting Your Data (Links to an external site.))	5	2/20/20
Assignment 7 (Metadata (Links to an external site.))	5	2/27/20

Assignment	Value	Due Date
Assignment 8 (Data Citation (Links to an external site.))	5	3/5/20
Assignment 9 (Analysis and Workflows (Links to an external site.))	5	3/12/20
SPRING BREAK		
Assignment 10 (Legal and Policy Issues (Links to an external site.))		
Guest speaker- Dr. Daniel Maxwell, Informatics Consultant, University of Florida - 6:30 pm - 7:30 pm	5	3/26/20
Data Preservation Project - Note: This is an individual project.		
Due date for project extended to April 9, 2020.	15	4/13/20
Guest speaker- Dr. Hannah C. Gunderman, Research Data Management Consultant, Carnegie Mellon University		
Open Science Framework Research Project (OSF (Links to an external site.)) - Note: This is a group project.		
1. Group 1	15	4/16/20
2. Group 2		
3. Group 3		
4. Group 4		
Data Management Plan from a funding agency of your choice - Note: This is an individual project.		
Guest speaker- Dr. Debjani Deb, ORNL DAAC - Head of Data Curation/Scientist - 6:30 pm - 7:00 pm	20	4/23/20
Bonus available (e.g. data cleaning, FAIR data example, Kaggle)	5	4/23/20
TOTAL	100	

Assignments: The course will use the Data Management Skill building Hub Teaching Module for assignments (<https://dataoneorg.github.io/Education/> ([Links to an external site.](#))) with lectures complimented by funded project activities, collaborations, experiences, and models from varied communities of practice. **Additional resources:** Consortium of European Social Science Data Archives (CESSDA) Training (<https://www.cessda.eu/Training> ([Links to an](#)

[external site.](#))), Digital Curation Centre Resources (<http://www.dcc.ac.uk/resources> ([Links to an external site.](#))), Earth Science Information Partners (ESIP) Data Management Training Clearinghouse (<http://dmtclearinghouse.esipfed.org/> ([Links to an external site.](#))), and ORNL DAAC <https://daac.ornl.gov/datamanagement/> ([Links to an external site.](#)).

Data project presentation: Students will create a data project utilizing the skills learned from the assignments, discussions, and presentations. The data project will be shared with the class for critique and discussions. **Note: This is an individual project.**

Open Science Framework Research Project (OSF): Students will develop an OSF project website which may be used to store and share their projects for this course. The instructor will demonstrate the use of OSF for an actual small internal grant proposal/research project. **Note: This is a group project.**

- OSF Guides: <https://help.osf.io/hc/en-us> ([Links to an external site.](#))
- OSF Home: <https://osf.io/> ([Links to an external site.](#))

Data Management Plan from a funding agency of your choice: Students will create a data management plan for their area of work using a funding agency of choice. Students will select an appropriate funding agency for their work (e.g. Department of Energy, National Science Foundation, USDA, etc.) and develop a data management plan for their project. Students may develop an infographic, presentation, or project in addition to an actual data management plan (DMP). **Note: This is an individual project.**

Disclaimer

The list of topics may change slightly depending on class interest, and interruptions due to school holidays or inclement weather. Please be aware revisions may be made to this syllabus over the course of the semester, and as such, the content contained within may be subject to change.