Course Information
GRAD 521 – Research Data Management
2 credits; class meets for 50 minutes twice a week
- 1st weekly meeting is a lecture
- 2nd meeting is a discussion
Offered: winter term (annually)
Meeting location: TBD
Prerequisites: none

Instructor Information
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Course Description
Careful examination of all aspects of research data management best practices. Designed to prepare students to exceed funder mandates for performance in data planning, documentation, preservation and sharing in an increasingly complex digital research environment. Open to students of all disciplines.

Course Content
This is a lecture-discussion course in which the instructor presents topics, discussion assignments are explained, and students complete assigned projects both during discussion periods and outside of class. Significant student participation in discussion sessions is expected. We assume that students generally have not had prior data management training, but students with prior experience can still expect to benefit significantly from this course. The purpose of the course is to enable students to properly manage research data as a means to foster efficiency, ensure proper stewardship of data, and exceed funder requirements for planning, preservation and sharing. This is not a course in data science or data analysis, and is not designed to prepare students to be database administrators.

Major course content includes the following seven topics. (See detailed course outline below under “Weekly Schedule”)

1. Overview of research data management, definitions and best practices
2. Types, formats and stages of research data
3. Metadata (data documentation)
4. Data storage, backup and security
5. Legal and ethical considerations of research data
6. Data sharing and reuse
7. Archiving and preservation

**Measurable Student Learning Outcomes**

By participating fully in this curriculum, the student should be able to:

1. Explain the need for managing/sharing research data, relevant public policies, and the lifecycle continuum for managing and preserving research data;
2. Identify potential re-users, communicate the value of their research data for re-use, and formulate a dissemination strategy;
3. Formulate an abbreviated data management plan or data curation profile to manage their research project data and define roles/responsibilities of research staff;
4. Explain the range of research data types, stages, formats, and relevant software that may need to be managed and preserved in future research efforts;
5. Propose what descriptive data needs to be documented in a standard way via metadata to allow research data sets to be managed and preserved;
6. Plan how to handle issues involved in securely storing research data in central databases, archives and/or repositories, backing it up, and managing access to data;
7. Explain legal (ownership) and ethical considerations related to data-sharing;
8. Plan for issues related to long-term preservation, discovery, and re-use.

**Evaluation of Student Performance & Grading Plan**

Students will be assigned a letter grade (A-F) based on the following:

- Weekly writing assignments: 40%
- Participation in weekly discussions: 10%
- Final exam, in the form of a data management plan: 50%

**Writing Assignments**

Writing assignments will be assigned once per week for the first 7 weeks of class. Assignments will be provided at the beginning of the week, and will involve reading assigned materials and preparing a written response prior to the discussion section later in the week. Readings are intended to prepare students for the discussion sections by reinforcing or expanding upon material covered in lecture, and by prompting each student to think critically about the material and apply it to his/her own discipline and/or individual experience.

**Participation**

Student engagement in group discussions is important and productive. As such, participation will be a component of the final grade. We won’t follow strict guidelines (e.g. “each student must speak at least once during the discussion…”), but your level of engagement will be noted.

**Final Exam**

The primary scholarly output for a student taking this course is his or her individual data management plan (DMP). Ideally, this plan would address the research project that each student is
involved in for his/her thesis or dissertation research, but plans describing a fictional research project from the student’s discipline will also be accepted. This is a take-home ‘exam,’ and grading criteria will be provided. The activity of creating the plan compels each student to assimilate course content and apply it to his or her own research project. As such, the DMPs will serve as a direct measure of how well they have understood the material presented in the course, and if the proposed learning outcomes were achieved.

**Learning Resources**

There are no required texts or supplies for this course. We will supply web links or PDF copies of selected reading assignments to the students as needed. See the list of required readings in the Appendix.

**Weekly Schedule of Learning Outcomes**

**Week 1 – Overview of Research Data Management**

- Explain what research data is/are
- Explain the need for managing/sharing research data and identify relevant public policies
- Explain the lifecycle continuum to manage and preserve research data
- Describe how data should be managed differently in different phases of the life cycle
- Identify data management plan (DMP) requirements used to characterize and plan for the lifecycle of research data.
- Describe the value and relative importance of data management to the success of a research project.

**Week 2 – Types, Formats, and Stages of Data**

- GUEST: Senior Software Engineer at OPeNDAP Inc., Nathan Potter
- Explain what a research data set is and the range of data types
- Identify stages of research data
- Determine common potential storage formats for data that will be accessible in the future and non-proprietary where possible (NP)
- Compare relevant quality control techniques/technical standards
- Identify methods of recording data that are specific to student’s discipline and research interests.
- Define data collection recording policies/procedures for student’s research.
- Describe best practices for starting and keeping a laboratory notebook

**Week 3 – Contextual Details Needed to Make Data Meaningful to Others**

- GUEST: Metadata Librarian, Maura Valentino
- Understand what metadata is
- Understand why metadata is important
- Identify applicable standards for documenting and capturing metadata
- Understand disciplinary practices associated with the collection and sharing of metadata

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• Formulate an approach to creating metadata for a project
• Understand benefits of using a unique researcher ID in metadata (e.g. ORCID or ISNI)

Week 4 – Data Storage, Backup and Security
• Understand why data storage, backup and security of research data are important
• Understand data storage, backup and security methods for research data
• Understand best practices for research data storage, access control, migration to newer storage media and security of research data
• Formulate an approach to creating a data storage, backup and security plan for a project

Week 5 – Legal and Ethical Considerations for Research Data
• GUEST: someone from Office of Research Integrity? Lisa Leventhal from IRB (HIPAA)?
• GUEST: someone from the Office of Commercialization and Corporate Development (IP)
• Explain ownership considerations related to data sharing
• Explain and evaluate potential legal issues connected to your data; intellectual property, copyright claims, licenses needed for use, monetary charges for data
• Explain ethical considerations related to data sharing
• Understand privacy levels for research data as required by potential funding agencies
• Recognize the importance of privacy with some forms of research data (HIPAA)
• Understand the importance of removing key personal identifiers to facilitate confidentiality
• Understand the need for data attribution and citation

Week 6 – Data Sharing & Reuse Policies
• GUEST: Sue Kunda, Digital Scholarship Librarian
• Identify issues related to discovery, reuse, and sharing
• Discuss issues/obstacles related to reuse and sharing
• Understand publisher and licensing restrictions on re-use of data, analysis software and instrumentation
• Understand Open Access requirements
• Understand controversies surrounding open science, open data
• Address re-use/sharing requirements from granting agencies or sponsors
• Address the need for conversion to standard formats needed for re-use
• Understand different types of collaborative workspaces for sharing data
• Identify who can share/access your data and for what purpose
• Determine requirements for pre/post publication access for project phases of the research
• Determine temporary or permanent access policy
• Define process steps and access levels for gaining access
• Understand options for maximizing data reuse
• Understand data identifiers and their use

Week 7 – Plan for Archiving and Preservation of Data
• Explain options for a long-term sustainable preservation strategy/policy for your data (e.g., discipline specific, institutional, departmental).
• Identify types of repositories/archives (discipline-based, institutional, etc.)
• Choose appropriate subject repository for long-term storage of data
• Understand process issues for depositing data in repository
• Identify issues related to discovery of relevant data sets for reuse
• Understanding the need for querying and retrieval methods - discovery aids for multiple user communities to find the data they want to reuse
• Explain data management tools and services available
• Understand costs for data storage, management tools and services

**Weeks 8/9 – Final Project**

Students create a detailed data management plan for their thesis/dissertation research project. Their plan should address topics 2 - 7 listed in “Course Content,” above.

**Statement Regarding Students with Disabilities**

"Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098."

**Expectations for Student Conduct, i.e., cheating policies**


**Appendix: Weekly Required Readings**

**Week 1: Overview of Research Data Management**


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**Week 2 – Types, Formats, and Stages of Data**
1. Defining Research Data (University of Oregon): [http://library.uoregon.edu/datamanagement/datadefined.html](http://library.uoregon.edu/datamanagement/datadefined.html)
2. Create and Manage Data: Formatting your Data (UK Data Archive): [http://www.data-archive.ac.uk/create-manage/format](http://www.data-archive.ac.uk/create-manage/format)

**Week 3 – Contextual Details Needed to Make Data Meaningful to Others**
2. File Naming & Tracking Changes (Version Control) (University of Oregon Libraries): [http://library.uoregon.edu/datamanagement/filenaming.html](http://library.uoregon.edu/datamanagement/filenaming.html)

**Week 4 – Data Storage, Backup and Security**
1. Backing Up Data (UK Data Archive): [http://www.data-archive.ac.uk/create-manage/storage/back-up](http://www.data-archive.ac.uk/create-manage/storage/back-up)

**Week 5 – Legal and Ethical Considerations for Research Data**
3. Constructing Access Permissions (University of Oregon Libraries): [http://libweb.uoregon.edu/datamanagement/sharingdata.html#three](http://libweb.uoregon.edu/datamanagement/sharingdata.html#three)


**Week 6 – Data Sharing & Reuse Policies**


3. Data Ownership, from Responsible Conduct in Data Management, Faculty Development and Instructional Design Center (Northern Illinois University): http://ori.dhhs.gov/education/products/n_illinois_u/datamanagement/dotopic.html


**Week 7 – Plan for Archiving and Preservation of Data**

1. Managing your Data: Data Centers and Repositories (University of Oregon): http://libweb.uoregon.edu/datamanagement/repositories.html
