

INSTRUCTIONS FOR COMPLETION OF THE UAMS GRADUATE SCHOOL COURSE APPROVAL FORM

1. Please save this PDF to your computer for editing.
2. The form has been designed with fields for your responses, and these are indicated in blue and gray shading. Please complete all fields. Use the “tab” key to move between fields. A ‘beep’ will sound if you attempt to enter a response that contains more characters than is permitted. **IF YOU NEED HELP IN ANY OF THE FIELDS, PRESS THE F1 KEY AND A HELP WINDOW WILL OPEN.**
3. Print the document, and then obtain the appropriate signatures before submitting the form to the Graduate Office.

**COURSE APPROVAL FORM, Graduate School
University of Arkansas for Medical Sciences**

This form and attached materials are due in the Graduate School Office on the first Monday of the month. All forms will be submitted to the UAMS Graduate Council Curriculum Committee for review and approval prior to consideration by the Graduate Council.

This form is not required for minor stylistic or editorial corrections to the title or course descriptions. These may be made when revising the catalog copy.

1. **Program:** Department of Biomedical Informatics | D | B | M | I | | | | |
Department *Alpha (Department) Code*

2. **Action proposed** (indicate one or more items): Effective term: Summer 2018

<input type="checkbox"/> Add course	<input type="checkbox"/>	Change title			
<input type="checkbox"/> Eliminate course	<input checked="" type="checkbox"/>	Change credit hours from:	1	to	<u>Variable</u>
(No outline needed)	<input checked="" type="checkbox"/>	Change course number		to	
		from:	6110		<u>BMIG 6120</u>
		Change description			

3. **Course ID, title and description:**

B	M	I	G	6	1	1	0	<u>Fundamentals of MRD</u>
prefix				number				title (20 characters)

Fundamentals of Managing Research Data

catalog name (40 characters)

Scheduled offering: Fall Spring Summer On demand

To cross list a course, use the Course Cross Listing Form.

Describe the course in sentence form using 50 words or less as it is to appear in the catalog. List prerequisites, co-requisites and possible off-site instructional opportunities or requirements.

This course presents the fundamental concepts involved in managing research data across the spectrum of Biomedicine. This pragmatic course covers basic data types, corresponding collection and management methods, and resource estimation. It will prepare doctoral students for the data collection and management aspects of their dissertation.

4. **Justification:**

Justify this change in terms of course needs or curriculum improvement. State the effect of this change on any degree programs. Identify the courses to be eliminated, if any, if this course is approved. (Course Approval Forms must also be submitted for these courses) Identify any existing course or courses that would extensively overlap or be duplicated if the proposed curricular change occurs. Provide statements of concurrence with the change from the chairperson(s) and dean(s) of the programs/areas offering the affected courses.

A change of course number is needed because it currently has the same course number as another course. The credit hours increased because of the amount of material that needs to be covered cannot be covered by 1 credit hour.

COURSE NUMBER: BMIG XXXX

COURSE TITLE: Fundamentals of Managing Research Data

COURSE DESCRIPTION:

This graduate course presents the fundamental concepts, theories and principles involved in managing research data across the spectrum of Biomedicine from molecules to populations. This introductory pragmatic course covers basic types of data, corresponding collection and management methods. Resource estimation and oversight will also be covered and will prepare doctoral students for the data collection and management aspects of their dissertation research and beyond.

PRE-REQUISITES: Students should take this course when they are planning their doctoral research.

GENERAL INFORMATION:

CREDITS: Variable

SEMESTER: Spring, Summer

LOCATION: Campus and Online (hybrid)

COURSE DIRECTOR: Meredith Zozus

SPECIAL ASSISTANCE: Students who believe they may need accommodations in this class based on mental or physical impairments must contact the Students with a disability that need accommodations should contact the Associate Dean for Academic Affairs at (501) 686-5730 to schedule an appointment to discuss your needs. Please make arrangements as soon as possible so accommodations can be made in a timely manner.

ATTENDANCE: Attendance is required for all classes. Excused absences may be obtained only by permission from the course director. Make-up exams will only be given under the most extenuating circumstances.

COURSE OBJECTIVES:

Upon successful completion of this course, the student is able to:

1. Describe sources of error corresponding to the fundamental types of data and prevention or mitigation strategies for each.
2. Develop a data collection strategy for a given research protocol.
3. Develop a data management plan using accepted standards and a Quality Management System approach for data collection and processing for a given study.
4. Describe and choose the best option from possible data collection and management options for a given research study.
5. Identify and select appropriate software for data collection and management.
6. Describe security risks and risk prevention or mitigation strategies for research data.
7. Estimate the resources required to collect and manage data for a research project.
8. Develop and describe a strategy for assuring appropriate and consistent data quality when data are collected or processed by multiple others.

- Describe documentation necessary to support sharing of data from a research project.

MAJOR TOPICS:

Basic types of data and corresponding error sources
Defining and documenting data for a research project
Data management planning for secondary data use and *de novo* collection of data
Data collection and processing methods commonly used in biomedical research
Documentation supporting traceability, reproducibility, and re-use
Software selection for collecting and managing research data
Resource estimation for data collection and processing
Quality management and control of research data
Special considerations for genomic, proteomic and metabolomic data
Presenting research data
Protecting research data from loss
Systems used in the course: REDCap, Microsoft Excel, common lab analyzer platforms, and institutional data storage and processing options

ASSIGNMENTS:

Weekly assignments, discussion forum posts, project presentation and report will require the following of the students.

- Classify the basic types of data for a particular study. List two sources of error for each and devise a strategy for prevention of mitigation.
- For a given research study and scenario, devise and describe the optimal data collection strategy.
- Critique and improve a data management plan for a research project.
- Given a raw dataset and analysis plan, develop and describe the needed data processing.
- Develop a data collection form for a study.
- Given a research study and scenario, identify and select appropriate software for data collection and processing.
- Identify security risks for a particular research scenario and propose strategies to prevent or mitigate data loss.
- Describe a data management quality system for a research group.
- Draft a data sharing plan for a research project and list documentation that should accompany shared data.

STUDENT EVALUATION & GRADING

Weekly discussion forum posts

36%

Weekly assignments must be posted in the discussion forum by class time the following week (1 pt). Due at the same time are comments on at least two posts by other students. Credit worthy comments contain new intellectual content including constructive suggestions for improvement.

Project poster presentation

12%

A poster presentation of the students' data management plan is provided at the course poster session. Students should be able to discuss and defend data management plans according to first principles, published evidence or established best practice. Graders will ask standardized questions at the poster session and assign scores to questions. Best poster (highest score) is awarded 5 extra credit points toward final grade, second place will receive two points and third receives one point. Ties all receive the points.

Final project

12%

The written data management plan for the planned research must be submitted by exam start time for the course. DMPs will be graded based on completeness and appropriateness of data management plans.

Final exam

40%

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The final exam will consist of 30 questions, be closed book and be administered during the scheduled exam time for the course.

TEXTBOOK:

Meredith Zozus, Managing Research Data. Taylor Francis/CRC Press, 2017.

Topics and assignments by week:

- Week 1: Course overview and introduction to fundamental types of data and managing them
Assignment: Identify the fundamental types of data involved in the student's planned research
- Week 2: The nature and structure of data. Lectures on 1.) genomic data, 2.) transcriptomic data, 3.) proteomic data, 4.) metabolomic data, 5.) cellular data, 6.) tissue data, 7.) organismal data, 8.) population data, and 9.) environmental data will be given, students will rotate among those most applicable to the planned doctoral research.
- Week 3: Identifying and defining data for a biomedical study
Assignment: Identify and define the data elements to be collected in the student's planned research; specify the data collection format.
- Week 4: Research reproducibility, data management planning and data management documentation. Data information flow.
Assignment: Draw a one page diagram showing all data sources and stores as well as major data processing steps for the student's planned research.
- Week 5: Data observation, recording and direct electronic acquisition
Assignment: Start a data management plan for the student's planned research. Complete the sections on data flow, and data acquisition.
- Week 6: Data processing, traceability and provenance
Assignment: no assignment.
- Week 7: Data processing, traceability and provenance cont.
Assignment: Complete the data management plan sections on data processing, traceability and provenance.
- Week 8: Data structure and integration
Assignment: Create a data model for the student's planned research.
- Week 9: Selecting data management software and storage
Assignment: Draft the software related sections of the data management plan for the student's planned research.
- Week 10: Assuring and controlling data quality
Assignment: Complete the quality management sections of the data management plan for the student's planned research.
- Week 11: Resource estimation and staffing
Assignment: Estimate the resources needed to collect and manage the data for the student's planned research. Draft a budget and staffing plan.

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- Week 12: Data ownership, security, and archiving
Assignment: Complete the data ownership, security, and archiving sections of the data management plan.
- Week 13: Data sharing, data sharing requirements and public repositories
Assignment: Complete the data sharing section of the data management plan.
- Week 14: Project work
- Week 15: Project presentations at poster session.

5. Program Approvals:

Fred Prior, PhD, Department of Biomedical Informatics
(Print or type) Chairperson, Academic Department or Area



Digitally signed by Fred Prior
Date: 2018.02.01 15:51:13
-06'00'

2/1/2018

(Signature) Chairperson, Academic Department or Area Date

College Dean (Dean McGehee for College of Medicine) Date

6. Graduate School Approvals

Chairperson, Graduate Council Date

Dean of the Graduate School Date