The University Of Toledo

New Graduate Course Proposal

* denotes required fields

1. College*: College Nat Sci and Mathematics

   Department*: Environmental Sciences

2. Contact Person*: Song Qian Phone: 530-4230 (xxx - xxxx) Email: song.qian@utoledo.edu

3. Alpha/Numeric Code (Subject area - number)*: EEES - ~~6160~~ 5160

4. Proposed title*: Advanced Environmental

   Proposed effective term*: 201540 (e.g. 201140 for 2011 Fall)

5. Is the course cross-listed with another academic unit? EEES 4160 ○ Yes ◉ No

   Approval of other academic unit (signature and title)

   Is the course offered at more than one level? ◉ Yes ○ No

   If yes, an undergraduate course proposal form must also be submitted. If the undergraduate course is new, complete the New Undergraduate Course Proposal; if the undergraduate course is existing, submit an Undergraduate Course Modification Proposal.

6. Credit hours*: Fixed: 3 or

   Variable: to

7. Delivery Mode:

	Primary*	Secondary	Tertiary
a. Activity Type *	Lecture	--SelectType--	--SelectType--
b. Minimum Credit Hours *	3		
Maximum Credit Hours *	3		
c. Weekly Contact Hours *	3		

8. Terms offered: ☑ Fall ☐ Spring ☐ Summer

   Years offered: ◉ **Every Year** ○ **Alternate Years**

9. Are students permitted to register for more than one section during a term? ◉ No ○ Yes

May the courses be repeated for credit? ◉ No ○ Yes Maximum Hours

10. Grading System*:

◉ Normal Grading (A-F, S/U, WP/WF, PR, I)

○ Satisfactory/Unsatisfactory (A-C, less than C)

○ Grade Only (A-F, WP/WF, PR, I)

○ Audit Only

○ No Grade

11. Prerequisites (must be taken **before**): i.e. C or higher in (BIOE 4500 or BIOE 5500) and C or higher in MATH 4200

none

○ PIN (Permisson From Instructor) ○ PDP (Permission From Department)

Co-requisites (must be taken **together**):

none

12. Catalog Description* (**75 words Maximum**)

A course in data management for environmental science graduate students covering the basics of data management practices and the use of Excel and R for data preparation, evaluation, analysis, visualization, and interpretation.

13. Attach a syllabus and an electronic copy of a complete outline of the major topics covered. Click here for template.

Additional Attachment 2: Browse...

File Type	View File	Delete
Syllabus	View	Delete
Attachment	View	Delete

14. Comments/Notes:

See attached files

15. Rationale:

See attached files

Course Approval:

Department Curriculum Authority:	Thomas Bridgeman	Date	2014/10/09
Department Chairperson:	Timothy Fisher	Date	2014/11/03
College Curriculum Authority or Chair:		Date	2014/11/28 JF GOTTGENS
College Dean: for B. Ashburner	Christine A. Hebrecht	Date	2014/12/17
Graduate Council:		Date	4-25-15 (EC 4.7.2015)
Dean of Graduate Studies:		Date	4-28-2015
Office of the Provost :		Date	

Submit

Administrative Use Only

Effective Date: (YYYY/MM/DD)

CIP Code:

Subsidy Taxonomy:

Program Code:

Instructional Level:

Registrar's Office Use Only

Processed in Banner on:

Processed in Banner by:

Banner Subject Code:

Banner Course Number:

Banner Term Code:

Banner Course Title:

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EEES 4160 Environmental Data Management/

EEES 6160 Advanced Environmental Data Management

Fall 2015

1. Instructor: Song Qian, Department of Environmental Sciences, 3001E BO, song.qian@utoledo.edu, 419-530-4230.

2. Teaching Assistants: TBA

3. Class Meeting Times: TBA

4. Office hours – TBA

5. Credit hour – 3

6. Overview: The course serves as an introduction to basic techniques and practices in data management, including data preparation, processing, exploratory analysis, visualization and interpretation. Excel is used for initial data preparation and processing, and R is used for data visualization and exploratory analysis. The course emphasizes the best practices in data management, and prepares students for their subsequent courses and research.

7. Course Contents

    1. Introduction – types of data, data analysis as a science, history of data science, relationship to statistics.

    2. Data management in Excel – importing text data files, manipulating data sheet, basic summary statistics, creating a metadata sheet, exporting data.

    3. Data management using R – getting started with R, data formats in R, data manipulation.

    4. R programming basics – importing/exporting data from/to Excel and other formats, basic summary statistics, subsetting and merging data files, writing and keeping R script files.

    5. Data visualization in R – univariate data, bivariate data, multivariate data, categorical data.

    6. Trellis plots and the concept of conditioning.

    7. Data evaluation – identifying and documenting potential outliers and other unusual features (using trellis plots), documenting the methods used for recording data values below method detection limits.

8. Documenting data analysis using dynamic documents in R – Using R markdown document to record steps taken.

9. Class project – Analyzing a data set from USGS, NOAA, EPA (STORET), or state agencies, and writing a report, including an introduction to the data (why it was collected, where, and how), a summary of main features of the data, plots for visualizing these features, and a tentative interpretation. An R markdown document with detailed R script should be accompanied with the report to document steps used to produce the report.

8. Texts, Software, and Data sets:

    1. Main text – J. Stanton, 2013. Introduction to Data Science. An interactive electronic book for iPad and iBook, available free of charge from iTune. Also available as a PDF file.

    2. R reference text – Petra Kuhnert and Bill Venables, (2006). *An Introduction to R: Software for Statistical Modelling & Computing*, available at the CRAN site,

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    3. Recommended reading –

        a. W. Clevelan, 1993. *Visualizing Data*, Hobart Press, Summit, NJ.

    4. Software:

        - R – an open source implementation of the S Language, available from CRAN at ,

        - RStudio – an open source integrated development environment (IDE) for R.

    5. Data sets – water quality and water resources data from USGS, climate data from NOAA, environmental monitoring data from EPA and state agencies.

9. Prerequisite: EEES 2500 for EEES 4160 only

10. Course Evaluation:

    - Individual homework (40% and 60% for EEES 4160) – 10 homework assignments (using Excel and R for data manipulation and visualization)

    - Midterm and Final exams (30% and 40% for EEES 4160)

    - Course project (30% for EEES 6160 only)

Each category will be graded in percentage and the final score is the weighted average of the three categories (also in percentage).

Course grades will be curved based on the final score. But in general, A (>90%), A- (85-90%), B (75-85%), C (50-75%), F (<50%).

11. Catalog Description: An introductory course in data management for environmental science graduate students and undergraduate seniors, covering the basics of data management practices and the use of Excel and R for data preparation, evaluation, analysis, visualization, and interpretation. Prerequisite: EEES 2500 for EEES 4160 or approval of instructor.