



SYLLABUS

**INSC 546 Environmental Informatics
Thursday, 6:30 – 9:10 pm
ONLINE ONLY Fall 2015
Any Classes will meet in COM 208**

Instructor: Mike Frame
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Availability: By Appointment
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Catalog Description

The course will focus on the application of information science practices, policies, and knowledge as it relates to the interdisciplinary field of environmental informatics.

Course Description

The course will focus on the interdisciplinary field of environmental informatics. When information science encountered the capabilities of computers and telecommunications in the late twentieth century, the discipline of informatics came into being. As does information science, informatics addresses the collection, classification, storage, retrieval, and dissemination of recorded knowledge. Application of computers and telecommunications—especially the Internet and the World Wide Web—to these functions has created new opportunities and new challenges for information management and delivery. And in the natural sciences, information science and computing technology are joined by the relatively new technology of geographic information systems to allow for an even greater depth of knowledge to be stored and applied.

A real world approach, through case studies, class projects, and guest lectures, will be employed to allow the students to experience the challenges facing researchers, land managers, decision makers, information professionals, and policy makers in the area of biological data acquisition, management, and delivery. The emphasis of the class will be on the data and information science aspects of environmental informatics through discussions in the areas of: information life cycle, metadata management, data and information standards, geospatial technologies, web technologies, and project management.

Prerequisites

None.

Course Goals/Objectives

Upon satisfactory completion of the course, the student will:

1. Understanding of the field of environmental informatics and the challenges that exist;
2. Knowledge of information standards and practices as they are applied to emerging environmental science issues;
3. Ability to develop and implement an environmental science monitoring program with emphasis on the information, computational, and geospatial challenges;
4. Understanding of geospatial standards, concepts, and terminologies;
5. Understanding of semantic principles, practices, standards, and applications;
6. Application of project management concepts and principles within the field of environmental informatics.

Course Materials

Optional texts

Gunther, Oliver. (2001). Environmental Information Systems. Published by Springer

Michener, William (2000). Ecological Data: Design, Management and Processing (Ecological Methods and Concepts) Published by Wiley-Blackwell; 1 edition (February 17, 2000)

Project Materials

Each student will be provided a “rain gauge” in support of their class project. These are available in the SIS Office in Suite 451 for pickup or mailing.

Assignments and Evaluation Criteria

Format: All assignments should be typed and handed-in via the designated space identified on the Blackboard class website. Use a 12-point font and single or 1.5 spacing. Submissions without identity cannot be credited.

- ♣ **Class Project 40%**
- ♣ **Midterm Exam 20%**
- ♣ **Final Exam 20%**
- ♣ **Contributions and Class Participation 20%**

Class Project (40% of the total grade)

Each student will be responsible for the design, development, and implementation of an Environmental informatics monitoring system. The project will consist of the deployment, monitoring, and analysis related to a rainfall station. Students will be provided a rain gauge for the collection of rainwater during the semester. Students may also purchase their own unit for rainfall collection. Students will be responsible for developing a monitoring strategy/protocol, defining an appropriate metadata standard, performing daily monitoring of rain fall, summarizing results (MS PowerPoint/Excel & developing a detailed Summary Analysis Report), and presenting results to class participants within a specified time limit. The project is meant to apply all of the basic concepts and principles discussed during the semester. Further details will be provided to students.

Class Participation (20% of the total grade)

You are expected to participate in class discussions either via “chat” discussions, e-mail, or interactively during class sessions. The following are typical discussions items you should make during the semester:

1. Post AT LEAST FOUR electronic messages during the semester sharing your thoughts, issues, related activities, and opinions related to course content. These can be in the form of other e-mails, instant messages during weekly course, or live discussions to students, instructor, or guest lecturers.
2. You may be asked during specific classes during the semester to make additional posts about activities mentioned during the particular class. This is to insure that you are attentive and participating in all classes during the assigned time.

Attendance and class participation will be evaluated as a part of this grade. This is a SYNCHRONOUS DISTANCE EDUCATION course (as compared to an ASYNCHRONOUS distance education program or correspondence), which means that we meet every week online. During class meetings we will all sign up during that time and talk to each other and participate and discuss aspects about the course. You must purchase a headphone with microphone to participate actively in class. An excuse of not have these accessories will be unacceptable.

Attendance and participation in class are compulsory since they are considered essential to learning via this electronic mode of interaction. If you have to miss a class for whatever reasons, you are still responsible for the materials covered. Please also let me know. Contributing to weekly discussions and participating in class discussions are essential and will be counted as part of this grade. The instructor will take attendance at any time during the class to check that you are not only logged on, but are paying attention during the class time. Plus, I will ask students questions randomly to check if you are attentive. If there is no response or it seems that you are not there during the class time then you will not be given attendance for that day.

Class Grade Scale

A:	93 – 100
B+:	89 – 92
B:	85 – 88
C+:	80 – 84
C:	74 – 79

INSC 546 Environmental Informatics

Syllabus

Week	Date	Topics
Week 1	August 20	<p>Welcome and Syllabus Discussions</p> <ol style="list-style-type: none"> 1. Class Introductions 2. Environmental informatics – what it is and isn't 3. Major components 4. Overview of the disciplines involved in Environmental informatics: <ol style="list-style-type: none"> a. Biological science b. Information science c. Computer science d. Geospatial science e. Social sciences 5. Class Project Discussion & Scope
Week 2	August 27	<p>Grand Science Challenges facing us today</p> <p>Guest lecture: Dr. Robert Cook, Oak Ridge National Laboratory</p> <ol style="list-style-type: none"> 1. Data Intensive Science – Examples for North America 2. Focus on Climate change <p>Current state of informatics as it relates to supporting science challenges</p> <ol style="list-style-type: none"> 1. Review of Assessment of Scientists <ol style="list-style-type: none"> a. Developed by NSF DataONE project & UTK b. Review of Federal Agency Scientists/Data Managers <p>Note: A classroom will be made available for those in the Knoxville area to attend the lecture.</p>
Week 3	September 3	<p>Biological Metadata Standards – Dublin Core, Darwin Core, Thesauri</p> <p>Guest lecture: Lisa Zolly, U.S Geological Survey, UTK Alumni Advisory Board</p> <ol style="list-style-type: none"> 1. Introduction to the Dublin Core standard as it relates to biological content 2. Applications of the standards 3. Importance of vocabularies, terminologies <p>Biological Metadata Standards – Darwin Core</p> <ol style="list-style-type: none"> 1. Introduction to the Darwin Core standard as it relates to biological content 2. Applications of the standards 3. Use globally by various organizations 4. Role the standard plays in data integration <p>Assignments Due: Draft Monitoring Protocol is due by the beginning of class.</p> <p>Note: A classroom will be made available for those in the Knoxville area to attend the lecture. Professor Frame will also participate in the lecture from the classroom on campus at UTK.</p>

Week	Date	Topics
Week 4	September 10	<p>Information Life Cycle</p> <p>The Information Life Cycle</p> <ol style="list-style-type: none"> 1. Science Data Life Cycle emergence 2. Cradle to grave management of scientific data and information 3. Why some organizations succeed and others fail <p>Metadata resistance</p> <ol style="list-style-type: none"> 1. The scientific model 2. Publish or parish paradigm 3. Incentives and rewards for data sharing 4. Real world examples of its usage and failures
Week 5	September 17	<p>Biological Metadata Standards – FGDC CSDGM BDP</p> <p>Guest lecture: Vivian Hutchison, U.S Geological Survey</p> <ol style="list-style-type: none"> 1. Introduction to the Federal Geographic Data Committee Biological Data Profile 2. Applications of the standards 3. Tools to support metadata development <p>Note: A classroom will be made available for those in the Knoxville area to attend the lecture.</p>
Week 6	September 24	<p>Taxonomy - The importance of taxonomy in Environmental informatics</p> <ol style="list-style-type: none"> 1. Role of taxonomy in Environmental informatics 2. Importance of standardization of scientific names 3. National & Global efforts underway 4. Tools, systems, and technologies available 5. Emerging concepts and trends <p>Q&A time will be available to discuss any questions related to Metadata Standards</p>
Week 7	October 1	<p>Mid-term</p> <p>The exam will consist of multiple choice and true/false questions. Exam will be based on 1st 7 weeks lectures. 1 hour in duration</p> <p>Class Project Q&A</p> <p>Assignments Due: Draft Metadata Standards (Dublin Core, FGDC) are due by the beginning of class.</p> <p>Break-out groups to discuss Draft Metadata Standards</p>

Week	Date	Topics
Week 8	October 8	<p>Project Management</p> <ol style="list-style-type: none"> 1. Concepts, principles, and practices as applied in a scientific domain 2. Tools and applications <p>Note: A classroom will be made available for those in the Knoxville area to attend the lecture.</p>
Week 9	October 15	FALL BREAK; ENJOY
Week 10	October 22	<p>Geospatial Technologies</p> <ol style="list-style-type: none"> 1. Why is it important 2. Basic concepts and terms 3. Mapping standards 4. Mapping tools <p>Guest Lecture: Dan Phillips, LIDAR Services Inc.</p> <ol style="list-style-type: none"> 1. Case Study – LIDAR Overview, Challenges, Benefits
Week 11	October 29	<p>International Informatics & Data Management activities</p> <p>Guest Lecture: Dr. Pedro Correa, University of San Palo, Brazil</p> <ol style="list-style-type: none"> 1. International environmental informatics activities 2. Challenges 3. Tools, Technologies, Approaches to Data
Week 12	November 5	<p>Semantics application in dealing with Environmental Data</p> <ol style="list-style-type: none"> 1. Semantic concepts & basic principles 2. Applications in earth sciences 3. Demonstrations & discussion
Week 13	November 12	<p>Scientific Modeling of environmental data</p> <p>Guest Lecture: Dr. Pedro Correa, University of San Palo, Brazil</p> <ol style="list-style-type: none"> 1. Concepts of modeling scientific data 2. Hands-on Environmental Modeling Exercises 3. Practical applications, approaches, and systems <p>Note: Lecture will be available in-person for those in the Knoxville area. Please bring computer for class Open Modeler breakout session.</p>
Week 14	November 19	<p>Data Management & the Sciences</p> <ol style="list-style-type: none"> 1. Panel Discussion with several Guest Lectures presenting what they view as the challenges, pitfalls, and future of Data Management, Big Data, and environmental informatics. <p>Note: A classroom will be made available for those in the Knoxville area to attend the lecture.</p>

Week	Date	Topics
Week 15	November 26	THANKSGIVING – No Class; ENJOY
Week 16	December 3	<p>Class Project Presentations</p> <ol style="list-style-type: none"> 1. Presentations will be given by each student related to their class project. (~10 minutes max per student (TBD)) 2. Class discussion and feedback <p>Assignments Due: <u>Project Analysis and Summary Report due by 6:30 ET</u></p> <p>Take home Final Exam will be handed out (DUE by 6:30 ET Tuesday 12/8)</p>
Week 17	<u>December 8</u>	Assignments Due: Take-home Final due by 6:30 ET . No class on Thursday December 10 th