Topics in Arts and Technology
ECOLOGY OF COMPLEX NETWORKS

Course Information

Course No.	**ATEC 6389.001**
Semester	Spring 2013
Date & Time	Thursdays 4:00–6:45pm
Location	UT Dallas main campus, ATEC Room 1.606
Coursebook	http://coursebook.utdallas.edu/atec6389.001.13s
Course website	http://elearning.utdallas.edu

Instructor

Dr. Maximilian Schich

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Phone	+1-972-883-4334
Office	ATEC 1.907
Office hours	Thursday 2:00–3:45 am and by appointment

Note   Email is the best way to contact me. To ensure prompt attention, please start your email subject with the course number followed by your first name in brackets: e.g. **ATEC6389 (Max) ...**
I try to respond to student email within 24 hours Monday through Friday.

Prerequisites

This course is open to graduate students only. Instructor's permission is required to enroll. Relevant backgrounds include *Arts & Humanities*, *Arts and Technology (ATEC)*, *Emerging Media and Communication (EMAC)*, *Computer Science*, and other areas. There is no formal prerequisite but basic mathematical and programming skills (algorithms, probability, linear algebra) are helpful.

The key requirement is an interest in *multidisciplinary research* with both *quantitative* as well as *qualitative* aspects.

Course Description

The *Ecology of Complex Networks* is a fundamental phenomenon that permeates data across multiple disciplines. The course will provide an introduction to this phenomenon with a (non-exclusive) focus on the arts, humanities and culture. The course will provide an overview of the emerging state of the field and it's connections to other relevant areas, such as biology, computer science, economics, engineering, math, physics, social science, technology, and others. Participants will acquire a basic understanding of complex network phenomena in a variety of fields, including what is currently known as data science and digital humanities.

Objectives

In addition to introductory lectures and multidisciplinary guest speakers from ATEC and beyond, students will form small teams to analyze, visualize and interpret complex network data. Students from ATEC, EMAC as well as Arts & Humanities will bring in their specific skills and are encouraged to collaborate and learn from each other. We will cross-fertilize literature work, critical seeing, as well as data skills (such as data acquisition, cleaning, analysis, and visualization).

Suggested Course Materials

Further readings (mostly scientific papers) will be assigned during the course.
Finding relevant literature is also part of the student projects.

General Audience Books
– Barabási, Albert-László: *Linked: How Everything Is Connected to Everything Else and What It Means*. (Plume, 2003).
– Mitchell, Melanie: *Complexity: A Guided Tour*. (Oxford University Press, 2011).

Textbooks
– Easley, David; Kleinberg, Jon: *Networks, Crowds, and Markets: Reasoning About a Highly Connected World*.
  (Cambridge University Press, 2010). Preprint on-line at http://www.cs.cornell.edu/home/kleinber/networks-book/
– Newman, Mark E.J.: *Networks: An Introduction*. (Oxford University Press, 2010).
– Barabási, Albert-László: *Network Science*. (to appear) Preprint online at http://barabasilab.neu.edu/networksciencebook/

Programs
– During the course we will use the following applications in class: Microsoft Excel (or an equivalent spreadsheet editor);
  Cytoscape (install from http://www.cytoscape.org); Gephi (install from https://gephi.org); and optionally NodeXL (Win-
  dows-only, install from http://nodexl.codeplex.com/).
– Students may use other state-of-the-art tools and languages to achieve the goals of the course at their discretion.
  Examples include NetworkX, igraph, R, Processing, D3, MatLab, Mathematica, etc.

Project Assignments

Objective   Performing a publishable research project (and publish) as relevant to the course.

Deliverables   **Project proposal (Due: Feb 27)**
                   A two to four page document that contains:
                   Project title; Team members; Motivation; Relevant prior work; Approach; Research plan.

                   Proposal presentation (Due: Feb 28)
                   We will follow the Ignite format (cf. http://en.wikipedia.org/wiki/Ignite_(event)). You will present *20 slides*
                   that will auto-advance every *15 seconds. To ensure success, you should submit the slides by midnight
                   before the class.* The presentation should contain:
                   Motivation (why is this interesting?); Relevant prior work; Potential contribution (why does this project
                   differ from prior work?); Game plan; Preliminary result (if any).

                   Progress report #1 (Due: Mar 27) and #2 (Due: Apr 17)
                   The progress report will be a draft of the final paper. During office hours or upon appointment, we can
                   always discuss the project independent of the project report.

                   Final paper (Due: May 1)
                   2500-3000 words (be concise). You should use reasonable journal/conference formats, such as http://
                   www.plosone.org/static/guidelines or http://www.epjdatascience.com/authors/instructions/regulararticle.

                   Final presentation (Due: May 2)
                   Prepare a 10 minute presentation about wour work.

Homework   Throughout the course students will complete homework assignments that accompany the projects.
                   Assignments may include conceptual work, bibliographic research, reading assignments, production of
                   sample data, visualization drafts, or short write-ups. Homework assignments are *due by midnight before
                   the class*, unless a different due date is given with the homework assignment.

Exams   There is no exam planned.

Grading Policy

Percentages   Project 40% + Attendance & Participation 40% + Presentation 10% + Homework 10%

Academic Calendar

The sequence of topics in the time-table below is tentative and subject to modification.

Session	Date	Lecture	Discussion
Session 1	Jan 17	Introduction: Why complex networks?	Five relevant topics
Session 2	Jan 24	Complexity and convention	Node and link types
Session 3	Jan 31	Network terminology	Finding relevant previous work
Session 4	Feb 07	Data science & Ecology of networks	Research pipeline setup
Session 5	Feb 14	Visualization of networks 1 (theory)	Visualization critique
Session 6	Feb 21	Visualization of networks 2 (practice)	Visualization critique
	Feb 27	*Project proposal presentation due*	
Session 7	Feb 28	**Project proposal presentations**	Project critique
Session 8	Mar 07	Networks of objects; Monument–Documentation	Topic debate
		Spring Break	
Session 9	Mar 21	Network dynamics; Sample & Remix	Topic debate
	Mar 27	*Project progress report due*	
Session 10	Mar 28	Networks in biology and science	Topic debate
Session 11	Apr 04	Connected Movie	How about Arts and Technology? (Skype)
Session 12	Apr 11	Social networks, Network music, etc.	Talk with guest speakers
	Apr 17	*Project progress report due*	
Session 13	Apr 18	Current topics in Network science 1	tbd
Session 14	Apr 25	Current topics in Network science 2	tbd
	May 01	*Final paper due*	
Session 15	May 02	**Project presentation**	Project critique

Course & Instructor Policies

Class policies
– All announcements will be sent **via email**. Students are responsible for reading each announcement in detail.
– All students will participate in the discussion. Observers are expected to participate in the discussion equally.
– Students need to read all the assigned readings or complete homework prior to the class discussion. Homework assignments need to be handed in by midnight before the respective class. The nature of an assignment including deliverables will be announced in class or sent out as an announcement.
– Students have the responsibility of backing up all their data, code, and preliminary work. It is highly encouraged to use a version control system, such as github, bitbucket, etc.
– Please contact the instructor if you have a disability that requires some arrangements so that appropriate arrangements can be made.

Paper presentation
Assigned moderators will make brief presentations about the premises and results of the paper project.
The essential elements of the presentation are:
– Basic info: Title, authors, publication venue, presenter's name
– Why should we care?
– What is the problem the paper addresses?
– Why is it exciting, interesting, novel?
– What is the key idea of the paper?
– Points for discussion: Three interesting and thought provoking issues for discussion.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to http://go.utdallas.edu/syllabus-policies for these policies. The principles of academic honesty and ethics will be enforced. You should credit all your sources.

The descriptions and timelines contained in this syllabus are *subject to change* at the discretion of the professor.