**Demystifying Technology Course Syllabus
UNVS 821/822 SEC**

**Instructor Information**

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Office Hours: MWF 8 AM – 9 AM, 11 AM – 12 PM, 1 PM – 2 PM (other times by appointment)

**Course Title and Information**

Demystifying Technology

Fall 2016

GenEd Area: Human Behavior (UNVS 821) or Science and Technology (UNVS 822)

3 credit hours

MWF, 9-9:50

**Micro-course Title and Information**

Big Data Analytics Using Python

11/07-11/18

Tuttleman 009

**Disability Disclosure**

Any student who has a need for accommodation based on the impact of a documented disability, including special accommodations for access to technology resources and electronic instructional materials required for the course, should contact course coordinator Dana Dawson at dgdawson@temple.edu or 215 204 6248 to discuss the specific situation prior to the beginning of the first week of classes or as soon as practical. If you have not done so already, please contact Disability Resources and Services (DRS) at 215-204-1280 in 100 Ritter Annex to learn more about the resources available to you. We will work with DRS to coordinate reasonable accommodations for all students with documented disabilities.

**Statement on Student and Faculty Academic Rights and Responsibilities**

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has a policy on Student and Faculty and Academic Rights and Responsibilities (Policy #03.70.02) which can be accessed through the following link: http://bulletin.temple.edu/undergraduate/about-temple-university/student-rights/.

**Micro-Course Description and Learning Goals**

Deep learning and big data are key components of most Internet technologies and a very popular area in information technology today. This micro-course will give students an appreciation of how analytics work and the role they play in modern information systems.

Students will learn how to conduct computer simulations of deep learning systems on large amounts of data. This will introduce several aspects of computing that students don’t normally get introduced to, including command line programming and scripting.

For this specific micro-course, students will:

1) basic Linux command line computer skills

2) learn how to set up and run a deep learning experiment using big data

3) understand the basic principles of how deep learning algorithms work and how they are applied to big data

4) gain insight into how computer software systems using analytics (e.g., Netflix, Pandora, Google Search) are developed.

**Course Learning Goals**

By the conclusion of this course, students will:

1) demonstrate a basic technical understanding of an information technology platform;

2) identify personal and professional enrichment options presented by information technology;

3) examine the social and cultural context surrounding the employment of information technology; and

4) evaluate security and privacy risks associated with information technology.

**Relevant GenEd Area Learning Goals**

Science & Technology courses are intended to teach students how to:

* Understand and describe the scientific process;
* Understand the sequential nature of science and technology;
* Recognize, use and appreciate scientific or technological thinking for solving problems that are part of everyday life;
* Understand and communicate how technology encourages the process of discovery in science and related disciplines; and
* Retrieve, organize, and analyze data associated with a scientific or technological model.

**Relevant GenEd Competencies**

This course will:

* develop students’ thinking, learning and communication skills;
* develop skills in identifying, accessing and evaluating sources of information; and
* promote curiosity and lifelong learning.

**Required Course Materials**

This course will make extensive use of web-based materials, including Lynda.com. To access Lynda.com, log into the TU Portal, select the link titled Lynda.com on the left under TU Applications, and follow the instructions. Additional resources will be made available from the microcourse website: *https://www.isip.piconepress.com/courses/temple/unvs\_0822/*.

**Graded Components of the Course**

Grades will be calculated based on three computer homework assignments (25% each) and classroom attendance (25%). A numeric attendance score will be computed as a simple percentage of the classes attended. Students should notify the instructor of any planned absences prior to missing a class.

Computer assignments will consist of a two-page write-up submitted as a pdf document submitted by email to the instructor by the deadline shown:

|  |  |
| --- | --- |
| Assignments | Class No. |
| Linux Command Line Programming | 3 |
| Deep Learning Pilot Experiment Using Theano | 5 |
| Big Data Exercise | 6 |

**Course Grading Schema**

|  |  |  |  |
| --- | --- | --- | --- |
| Grades Scored Between | Will Equal | Grades Scored Between | Will Equal |
| 92-100 | A | 72-less than 78 | C |
| 90-less than 92 | A- | 70-less than 72 | C- |
| 88-less than 90 | B+ | 68-less than 70 | D+ |
| 82-less than 88 | B | 62-less than 68 | D |
| 80-less than 82 | B- | 60-less than 62 | D- |
| 78-less than 80 | C+ | 0-less than 60 | F |

**Relevant Temple Resources for Students**

Temple University Writing Center: http://www.temple.edu/writingctr/
The Writing Center's mission centers around providing individual support to writers across the University. The Center is managed by a four-person administrative staff. Through our academically-diverse tutoring staff, conversation partners and attentive office assistants, we provide one-on-one support for writers and for English Language Learners. For information about scheduling a Writing Center appointment and our hours, please refer to our home page.

Center for Learning and Student Success: http://www.temple.edu/class/
At the Center for Learning and Student Success we strive to create an environment that fosters a balance of intellectual stimulation with productive and engaging academic support for our students. The resource center is a welcoming atmosphere for all students enrolled in math, science, statistics, and other quantitative courses. The student centered learning and enrichment facility, led by content qualified peer tutors, is designed to help all students achieve their highest potential as they aim to reach their academic goals.

**Detailed Outline of Weekly Activities**

This two-week micro-course will consist of 6 one-hour lectures designed to teach students how to run a realistic machine learning experiment under Linux. We will use the Theano deep learning software package, and execute some basic commands in Python. Students will be provided step-by-step instructions how to execute commands.

The six lecture sequence will consist of:

|  |  |  |
| --- | --- | --- |
| **Lecture** | **Topics** | **Description** |
| 1 | Linux ComputingAssignment No. 1 | Students will learn how to log into a remote server, navigate the file system, view data, and execute simple commands. Assignment No. 1 will involve basic Linux competency tasks. |
| 2 | Deep Learning Systems | A non-mathematical overview of the essential components of this technology. The focus will be on modeling capabilities of the system, how to train and evaluate models, and how the resulting models can be applied to applications. The session will conclude with some Linux practice. |
| 3 | Big Data ResourcesAssignment No. 2 | Students will learn how to manage large data repositories of audio, image and EEG data. The emphasis will be on file system manipulations and tools to validate data. The session will include extensive computer work (simple command line exercises). The quiz will consist of an interactive exercise where they solve a simple data problem using command line tools. Assignment no. 2 will consist of building a simple system to classify images. |
| 4 | Introduction to Theano and Python ProgrammingAssignment No. 3 | Instruction on how to use existing tools to develop models in the Python programming language. No prior programming expertise will be required. The emphasis will be on using existing commands and infrastructure. Assignment no. 3 will involve developing and optimizing a more advanced classification system, building on assignment no. 2. |
| 5 | Scripting with Theano | Students will learn how to create and execute Theano commands. Classroom support for assignment nos. 2 and 3 will be included. |
| 6 | * Big Data Example
* Applications Revisited
 | Demonstration of how to train and evaluate systems on large data sets. |

A typical assignment will be to develop a system to classify images. The specific application will evolve from year to year depending on the popularity of particular datasets. This semester we will work with a bioengineering dataset.

For this assignment, students will train a model and then evaluate its performance on a database consisting of thousands of records (e.g., images). Students will learn how to trade off different types of errors based on parameter settings, and how to optimize performance by modifying system parameters.

We will typically hold a competition and reward the student who posts the overall best performance on assignment no. 3. More details on that will follow.

A course web site will be developed and used to distribute material. It is located at https://www.isip.piconepress.com/courses/temple/unvs\_0822.