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Office Hours: by Appointment / Online

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Prerequisite / Co-requisite: IST 687: Introduction to Data Science - additional course description below.

Audience: Graduate online only.

Description: A broad introduction to analytical processing tools and techniques for information professionals. Students will develop a portfolio of resources, demonstrations, recipes, and examples of various analytical techniques.

Additional Course Description: You will find if much easier to succeed if you have completed IST687, IST777 or both. Familiarity with command-line interfaces, basic quantitative skills, including statistics, as well as programming skills with languages such as R or Python. Most of the course work will be using Python, Spark, and Tensorflow.

Credits: 3

Learning Objectives:

During the course, we will emphasize:
1. Experiential learning through reading and practical exercises.
2. Collaborative learning through online discussions between instructors and peers.
3. Self-learning with appropriate instructional support and timely feedback using analytical case studies.

In order to be successful in this course, the student will:
1. Pro-actively research solution options vs. relying solely on textbook content.
2. Actively code while completing the reading assignments.
3. Present results in a professional manner. Comments – Clarity – Correctness – Credit.
4. Submit their assignments on time.

After taking this course, the students will be able to:
1. **O**btain data and explain data structures and data elements.

2. **S**crub data by applying scripting methods, to include debugging, for data manipulation in Python, R or other languages.
3. **E**xplore data by analyzing using qualitative techniques including descriptive statistics, summarization, and visualizations.

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4. **M**odel relationships between data using the appropriate analytical methodologies matched to the information and the needs of clients and users.

5. I**N**terpret the data, model, analysis, and findings. Communicate the results in a meaningful way.

6. Select an applicable analytical methodology for real problems in areas such as business, science, and engineering.

Bibliography/ Texts / Supplies:

Required:

Miller, Thomas W., **Modeling Techniques in Predictive Analytics with Python and R**, Pearson, 2015.

Goodfellow, Ian, Yoshua Bengio, and Aaron Courville, **Deep Learning (DL)**, MIT Press, 2016. Available at http://www.deeplearningbook.org/.

Additional:

James, Gareth, Daniela Witten, Trevor Hastie, and Robert Tibshirani, **An Introduction to Statistical Learning with Applications in R**, Springer, 2013. Available at https://www-bcf.usc.edu/~gareth/ISL/ISLR%20First%20Printing.pdf.

Software:

Python - https://www.python.org/

Anaconda - https://www.anaconda.com/distribution/

IBM Watson Studio - https://www.ibm.com/cloud/watson-studio

Requirements:

Course Assignments / Percent of Final Grades / Due Dates:

	Tasks	Percent of Course	Due Dates
1	Laboratory Exercises	36%	Week 3, 6, 9
2	Course Participation	15%	Weekly
3	Project Checkpoints	4%	Week 5 & Week 7
4	Final Project	30%	Due at end of course
5	Group Discussions	15%	Weekly

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Assignment #1: Laboratory Exercises
Laboratory exercises provide open-ended problem-solving experiences that build on the material covered in the readings. The laboratory exercises facilitate the learning objectives of the course by providing the opportunity to apply techniques from class to realistic problem-solving situations. The instructor will provide a separate laboratory instruction document for each assignment. There are 3 laboratory exercises in this course worth a maximum of 12 points each. Maximum points are possible if the submission is on-time, complete, and correct.

Assignment #2: Course Participation
Data science is a young and fast moving professional field built on foundations of mathematics and computer science. The asynchronous materials provide multiple engagement opportunities each week. Each week will provide questions and activities designed to evaluate comprehension of fundamental analytical principles. Maximum points are possible if the student completes the asynchronous questions and activities prior to the weekly group discussion.

Assignment #3: Final Project
For the final project, students will identify a data-focused problem, bring together different data sources, conduct analysis, draw conclusions, and produce a report explaining the results. Maximum points are possible if the submission is on-time, complete, and demonstrates the student's ability to select the appropriate analytical methods to the chosen problem; interpret the data, model, analysis, findings; draw appropriate conclusions; and present the results in a meaningful way.

Assignment #4: Group Discussions
The weekly group discussion provides an opportunity for students to engage the instructor and the class while demonstrating understanding of facts and ideas from the asynchronous session. Each week will provide a case / reading material focused on a select topic, methodology, or business application. Maximum points are possible if the student is present, prepared, and engaged during the weekly group discussion.

Grading:

Grades for specific assignments and the course final grade will be assigned by the instructor through the course's on-line site. There are 100 possible grade points in this course and each Assignment's grade value goes directly toward the total earned by each student. The numeric final point total will translate to the final letter grade for the course as follows:

A	100-95	A-	94-90	B+	89-85	B	84-80	B-	79-75
C+	74-70	C	69-65	C-	64-60	F	➢ 63		

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Course Specific Policies on attendance, late work, make up work, examinations if outside normal class time, etc.:

For late submissions, the grade of the assignment will be multiplied by the following factor where days is the number of days submitted late (thanks to acuna.io for this equation/construct):

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Def grade_factor (days):
        If days > 3:
                Return 0
        Else:
                Return 1/(1 + days)**(3/4)
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For example, an assignment turned in one day late is worth 60% of the original grade. For any assignment turned in past the original due date (even with prior instructor coordination), the days variable is set to 0.15.

Academic Integrity Policy

Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. SU students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information about the policy, see http://academicintegrity.syr.edu.

The Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including course failure, regardless of violation level. Any established violation in this course may result in course failure regardless of violation level.

Disability-Related Accommodations

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), disabilityservices.syr.edu, located at 804 University Avenue, room 309, or call 315.443.4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue "Accommodation Authorization Letters" to students as appropriate. Since accommodations may require early planning and generally are not provided

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retroactively, please contact ODS as soon as possible. Our goal at the iSchool is to create learning environments that are useable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please meet with me to discuss additional strategies beyond official accommodations that may be helpful to your success.

Religious Observances Notification and Policy

SU's religious observances policy, found at supolicies.syr.edu/emp_ben/religious_observance.htm , recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students should have an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors no later than the end of the second week of classes through an online notification form in MySlice listed under **Student Services/Enrollment/My Religious Observances/Add a Notification**.

Student Academic Work Policy

Student work prepared for University courses in any media may be used for educational purposes, if the course syllabus makes clear that such use may occur. You grant permission to have your work used in this manner by registering for, and by continuing to be enrolled in, courses where such use of student work is announced in the course syllabus.

I intend to use academic work that you complete this semester for educational purposes in this course during this semester. Your registration and continued enrollment constitutes your permission.

I intend to use academic work that you complete this semester in subsequent semesters for educational purposes. Before using your work for that purpose, I will either get your written permission or render the work anonymous by removing all your personal identification.

Week	Topic	Readings	Assignments
1	**Aligning** Align our class with the methods, goals, and expectations of the course.	MTPA 1 MTPA A.1 & A.2	Syllabus Quiz Profile Post Group Sign-up
2	**Describing & Modeling** Describe a data set using summary statistics and visualizations. Model patterns in data to better understand a process.	MTPA 2 MTPA A.3	
3	**Choosing** Identify patterns in behavior to better match consumer choice.	MTPA 3 & 4	Lab Exercise 1
4	**Forecasting** Looking to the future with temporal data.	MTPA 5	
5	**Inferring** Infer the unknown given a set of thoughts or words.	MTPA 7 & 8	Project Checkpoint
6	**Picking** The winners from the losers – classification is the name of the game.	MTPA 9	Exercise 2
7	**Choosing Again** A Bayesian approach to choice.	MTPA 11	Project Checkpoint
8	**Machine Learning** Combine data sets and produce meaningful analysis.	DL 1-2 DL 6	
9	**Machine Learning II** Identify, resolve, and hopefully avoid the pitfalls of analytics.	DL 1-2 DL 6	Exercise 3
10	**Project Presentation** Present results in a meaningful way.	Instructor provided	Final Course Projects

11	**Project Presentation** Present results in a meaningful way.	Instructor provided	Final Course Projects