Salem
STATE | UNIVERSITY

Syllabus

This semester our class is entirely face-to-face. We will meet each class meeting.

Details are on the CANVAS.

CSC 276 Intro to Data Science   **4.0 credits**

Instructor	Dr. Fatema Nafa
Email	fnafa@Salemstate.edu
Office Hours	Tuesdays &Wednesdays 2:00 PM – 3:00 PM & **by appointment**
Lecture Time	**Tuesdays & Thursdays: 12:15 PM – 01:30 PM**
Place	**Meier 346**
Final Exam: Tuesday December 21 11:00 – 1:00	

Course Description:

The course on Introduction to Data Science provides an overview of Data Science, covering a broad selection of challenges in and methodologies for working with big data. Topics to be covered include fundamentals of data manipulation with Python, answering questions with messy data, Natural language processing, graph analysis and random walk, social network analysis, visualization, prediction and informed decision making, as well as data security and data privacy. Professional skills, such as communication, presentation, and storytelling with data, will be fostered. Students will acquire a working knowledge of data science through hands-on projects and case studies in a variety of business, engineering, social sciences domains. Issues of ethics, leadership, and teamwork are highlighted.

Prerequisite:

CSC 115

Course Materials (Optional):

- Data Science and Big Data Analytics by Wiley
- Doing Data Science by Oreilly.

Software:

Canvas: Most course material will be distributed only on the web at the https://elearning.salemstate.edu. Use it as a clearing house for all course information, including this syllabus.

Programming languages: R, Python, SQL Server, Tableau, and others.

Libraries: NumPy, SciPy, Pandas, igraph, SciKit learn.

NetLogo (sometimes the 32bit version works better even for 64bit computers): https://ccl.northwestern.edu/netlogo/

Learning Objectives
- Introduce students to fundamental principles of data science.
- Teach basics of data science, stimulate data-analytic thinking, and develop data-analytic skills.
- Teach basic methods for effective data communication and visualization and demonstrate their use in data representation.
- Provide hands-on experience in applying basic data science methods and algorithms and interpreting their results.

Learning goals:
The goals for this course meet at an introductory level the overall goals for the Data Science Program including:
- **Data Acquisition**: collect, store, preserve, manage and share data in a distributed environment through practical, hands-on experience with programming languages and big data tools.
- **Problem Exploration**: develop problem solving skills through experiences that foster computational and data-analytic thinking.
- **Analysis**: develop a basic understanding of the key technologies in data science: data mining, machine learning, visualization techniques, predictive modeling, and statistics.
- **Domain knowledge**: experience discipline-specific data use cases in order to solve real-world problems of high complexity.
- **Interpretation**: learn methods for effective data communication and visualization, and demonstrate their use in data representation;
- **Social Value**: explore social and ethical implications of the use of data and technology.

Specifically, after taking this class, students should:
- Understand the role of the data science in today's world, in business, medicine, entertainment, social networking, and other domains.
- Be able to identify the kinds of problems for which data science may provide intelligent solutions.
- Understand the components and challenges of the entire data science pipeline.
- Be able to use basics techniques for collecting, cleaning and sharing data.
- Understand basic methods and related tools that are used for effective data analysis and visualization.
- Be able to apply basic data science methods, processes, and algorithms using open-source tools.
- Demonstrate an ability to ask questions, express data creativity, and communicate data-driven discoveries.

Keys to Success
- **Plan ahead!** Success in this course requires project management skills: identify milestones and deadlines and plan your work accordingly.
- **Coordinate the work schedule** for this class with the schedules for your other classes, work, and other activities. You are likely to have many deadlines toward the end of the semester, so it's important for you to keep up.
- **Give yourself plenty of time** to prepare for each class. You will find some of the readings challenging, I know, but get as much as you can from each one. If you are not prepared for class, you will not be able to fully participate in (and benefit from) each class meeting.

- **It is important for each class member to participate**. It's also more interesting and more fun for us all!
- If you have any questions or concerns about the class or your work for the class, please talk to me about them. I cannot help you if I don't know there is an issue, and it is always easier to deal with problems earlier rather than later.

Course Topics:

A detailed topics list and a general course bibliography can be found on the Computer Science Department website at

Format and Procedures:

This course includes **lectures, labs, homework**, **assigned readings**, **projects, quizzes**, and **exams** (**Midterm** and **Final**).

- **Class Participations and Labs:** Lectures will be given in the assigned lecture room twice a week. There is a laboratory associated with each lecture. The lab will complement the lecture and support the application of materials learned. **Attendance and participation are required**. Lectures will be followed by an in-class lab exercise that assists in the learning process. The last 20 minutes of each lecture will be lab work with a score given based on attendance and successful completion of lab exercises. These "labs" will immediately apply material from the lecture and serve as an introduction to the other programming assignments.
- **Written Assignments:** At the end of every other week, we will either have a problem set or a programming assignment. Students must work individually on these assignments.
- **Projects:** paired or individual projects are required by the end of the semester. The time schedule and grading details for the projects will be provided through the classes via iterations.
- **Quizzes:** Quizzes will be given **in class**. Students must work individually on these quizzes.
- **Exams:** Exams are in-class exams (a mid-term of 90 minutes and a final of 120 minutes). There will be one midterm and one final (comprehensive) examination. The midterm will be held on **week 8 or 9** depending on the class progress, and the final will be held on **week 16** *depending* on class progress. **Please do not arrange any other activities on the posted exam dates.**

Zoom and Lecture Policies

The Salem State University Student Code of Conduct applies to online behavior as well as in-person or classroom behavior. You are expected to be professional and respectful when attending class on Zoom. **The following are class policies for our meetings with Zoom**.

Please read carefully, these policies are effective immediately and apply for the remainder of the semester. All students are expected to adhere to the policies.

- **LOG in** with your full first name and last name as listed on the class roster. Do not use a nickname or other pseudonym when you log in. (It makes it impossible to know who is in attendance. Using your full name, quickly sorts student into their groups when needed). Users who do not provide their full names will NOT be admitted to class. **Exceptions**
- Since enrolling in the class, some students have changed their names to better reflect their gender identity. If you currently use a different name than what is listed on the official roster, please send me a private Canvas message so I can note this on my roster. Then you can use your current name on Zoom!
- If you do not have access to a computer or smartphone with internet access, call into class from a phone line. This is not optimal; please try to **locate an internet-enabled device to use for class**.

- Stay focused. Please stay engaged in class activities. Close any apps on your device that are not relevant and turn off notifications.

- Need technical help? Contact the IT Help Desk at it-helpdesk@salemstate.edu or 978.542.2036. Or, create a ticket on the help desk portal: Salem State ITS Help Desk.

VIDEO

- Turn on your video when possible. It is helpful to be able to see each other, just as in an in person class. **Exceptions** If you have limited internet bandwidth or no webcam, it is ok to not use video. If you're unable to find an environment without a lot of visual distractions, it is also ok to turn off your video.
- Keep it clean. Don't share anything you wouldn't put up on the projector in class!

AUDIO

- Mute your microphone when you are not talking. This helps eliminate background noise.
- Use a headset when possible. If you own headphones with a microphone, please use them. This improves audio quality.
- Be in a quiet place when possible. Find a quiet, distraction-free spot to log in. Turn off any music, videos, etc. in the background.

CHAT

- **Stay on topic**. Use the chat window for questions and comments that are relevant to class. The chat window is not a place for socializing or posting comments that distract from the course activities. If you fill it up with random comments, I will be unable to sort through the information quickly to address students' real questions/concerns about the course.
- **No disrespect or hate speech**. Just like in our in-person class, respectful behavior is expected. Consider Zoom a professional environment, and act like you're at a job interview, even when you're typing in the chat.
- Student **attendance is MANDATORY**, and student participation is encouraged to facilitate the learning process. **Missing three classes is subjected to be reported**
- Students are expected to attend every class, and to arrive on time. Missing class **more than three times** without a legitimate excuse will be officially acknowledged in an email to you and your advisor. Regardless of the reasons for your absences, the first three will be considered "excused," and every absence thereafter **will not be excused**. Moreover, I will also **subtract 3 points** from your course grade for **each absence** after the third one. If you must miss class for a legitimate reason, please notify me in advance, if possible.
- Students are **responsible for all materials presented in class**, examinations, and other announcements. No excuses of any nature will be construed as relieving you from the responsibility for completion of the work assigned.
- The lecture is the student's responsibility if class is missed; it is in the student's best interests to get the notes from a fellow student. The instructor does not have slides or lecture notes to hand out.
- **No late submissions** will be accepted, and no extensions will be granted except for a family or medical emergency. We will be using the online **Canvas** assignment submission system. You can continue to resubmit your files as many times as you would like up until the deadline, so please feel free to **upload early and often**. If you submit an assignment even one minute past the deadline, then the assignment will be marked as late.
- The assignments will be posted on **Canvas** in the "**Assignments**" section. Each assignment will include instructions, a due date, and a link for electronic submission.

- Any form of dishonesty or cheating is not tolerated. While all students are encouraged to openly discuss and ask questions, the **final work to be submitted must be the student's own**.
- There will be a series of written assignments from the textbook and other sources: *question-answering and/or short essay-writing*. Reading will be a part of the written assignments. Please note that in addition to these (**written**) assignments there will be (**programming**) projects. There is a deadline to each assignment, and a penalty will be imposed for late submissions.
- **Make-ups** are only allowed under **extraordinary circumstances**. Students must provide a satisfactory reason (as determined by the instructor) along with **proper documentation**.
- I strongly encourage study groups, but I require that each student hand in his/her answers in his/her own words - if two answers are highly similar to each other, neither will receive credit.
- All assignments must be submitted at **Canvas**.
- No **submission will be accepted after the final examination**.

Grading Procedures:

Students' final grades will be determined using the following grading weights:

Class Participations	**15%**
Written Assignments	**25%**
Project	**30%**
Midterm Examination	**15%**
Final Examination	**15%**

Grading Criteria:

SCORE	GRADE	SCORE	GRADE
93-100	**A**	73-76	**C**
90-92	**A-**	70-72	**C-**
87-89	**B+**	67-69	**D+**
83-86	**B**	63-66	**D**
80-82	**B-**	60-62	**D-**
77-79	**C+**	0-59	**F**

Tentative Schedule (Subject to Change as Per Instructor's Discretion)

Week	Date	Day	Topic for Lecture
1	09/02	Thru.	**Module 1:**
	09/07	Tues.	Course mechanic & Logistics,
			Introduction to Data Science
			What is Data Science?
			Why it is important to study Data Science?
2	09/09	Thru.	**Module 2:** Fundamentals of Data Manipulation with Python
	09/14	Tue	
3	09/16	Thru.	

	09/21	Tues.	**Module 3**: Basic Data Processing with Pandas
4	09/23	Thru.	**Module 4:** Answering Questions with Messy Data
	09/28	Tues.	
5	09/30	Thru.	**Module 5:** Natural language processing
	10/05	Tues.	
6	10/07	Thru.	**Module 6:** Graph Analysis and Random Walk
	10/12	Tues.	
7	10/14	Thru.	**Module 7:** Social Network analysis
	10/19	Tues.	
	10/21	Tues.	
8	10/26	Thru.	**Module 8:** Machine Learning Feature Extraction, Engineering and Clustering
	10/28	Tues.	
9	11/02	Thru.	**Module 9:** Data visualization
	11/04	Tues.	
10	11/09	Thru.	**Module 10:** Page Rank (Map Reduce)
	11/11	Tues.	
11	11/16	Thru.	**Module 11:** Fundamentals of Scalable Data Science
	11/18	Tues.	
			Thanksgiving Break
13	11/30	Thru.	**Module 12:** Ethics of Big data
	12/02	Tues.	
14	12/07	Thru.	**Module 13:** Knowledge Base Applications and data science projects
	12/09	Tues.	Last Day of classes
			Final Exam: December 21 11:00 – 1:00

Important Notes:

- "Students must comply with the **Covid-19** Health and Safety Protocols for the 2020-2021 Academic Year. This includes wearing masks in class and on campus in public spaces, practicing physical distancing where possible, including in-class, engaging in a daily symptom check, notifying Counseling and Health Services at 978-542-6413 if they have any symptoms associated with COVID-19, and not coming to campus or to an in-person class if they have any of the symptoms related to COVID-19 until cleared by the Student Life Wellness Area. Students who have documented disabilities that may prevent them from complying with these policies are required to contact the Disability Services office."
- All students are expected to be familiar with the academic regulations, including those regarding Academic Integrity, for Salem State University as published in the college catalog. In addition, each student is responsible for completing all course requirements and for keeping up with all that goes on in the course (whether or not the student is present).
- In the event of a university declared a critical emergency, Salem State University reserves the right to alter this course plan. Students should refer to Salem State for further information and updates. The course attendance policy stays in effect until there is a university declared a critical emergency.

In the event of an emergency, please refer to the alternative educational plans for this course located IN **CANVAS**. Students should review the plans and gather all required materials before an emergency is declared.

- Salem State University is committed to providing equal access to the educational experience for all students in compliance with Section 504 of The Rehabilitation Act and The Americans with Disabilities Act and to providing all reasonable academic accommodations, aids, and adjustments. Any student who has a documented disability requiring accommodation, aid, or adjustment should speak with the instructor immediately. Students with Disabilities who have not previously done so should provide documentation to and schedule an appointment with the Office for Students with Disabilities and obtain appropriate services

- In the event of a university declared critical emergency, Salem State University reserves the right to alter this course plan. Students should refer to salemstate.edu for further information and updates. The course attendance policy stays in effect until there is a university declared a critical emergency. In the event of an emergency, please refer to the alternative educational plans for this course located at Canvas (https://elearning.salemstate.edu/). Students should review the plans and gather all required materials before an emergency is declared.

Note:

Please remember that if, for any reason, you decide to drop this course, you **MUST** do so officially through the **Registrar's office**. The last day to withdraw from a course this semester is **September 18.**

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance

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