Syllabus, Fall, 2021
COMP 353-001 – 5331
COMP 453-001 – 2423

Title: Database Programming
Time/Place: Tuesday, 5:30 – 8:00, Cuneo Hall 202
Instructor: Channah F. Naiman
Email: cnaiman@luc.edu
Office Hours: There may be some in-person office hours on Tuesday before class. As the semester progresses, it will be more helpful to have team zoom meetings. Most likely, especially due to covid concerns, office hours will most likely be by zoom.
Zoom Room (for office hours and for 3 lectures): https://luc.zoom.us/my/cnaiman

Orientation (includes the Video Tour of the Course)

Specific implementation for this semester

This section of COMP 453 will use Python to access a MySQL database both locally and remotely. The Flask web development framework is used. We will incorporate both standard SQL queries as well as SQLAlchemy as an object-relational mapping (ORM) tool. A complete website with user account support and CRUD capabilities is developed. Python will also be used to introduce MongoDB for data cleaning and querying, using the MongoDB Aggregation Framework as well as the MongoDB query language. We will use Jupyter Notebooks for interactive testing, MongoDB Atlas as a cloud-based host, and Compass as a local GUI.

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Prerequisites

COMP 271 or COMP 251 (or equivalent)

Textbooks (and other materials used in place of a text)

No single textbook covers all of the topics for the course. There are many resources available for the different components of the course:

- *Database Design and SQL*: Several of the lectures and assignments in the first few weeks will draw upon Fundamentals of Database Systems, by Elmasri and Navathe, 7th edition.   The 7th edition is the most recent. I bought a pdf version for $3 on ecrater.com, but I understand that it is now easily found online for free.   The fundamentals, which are relational database design, do not change. I will also provide detailed labs for SQL.
The text information for the print version is: ISBN-13: 978-0133970777   ISBN-10: 0133970779. However, it is strongly recommended that you purchase an inexpensive e-book online, as you will use it for a few chapters and for reference. All text lectures are also supported by my videos, which also incorporate examples and supplementary materials that are not from the text.

  Videos: There are links to the videos in the Course Schedule. Those link to videos on my personal box.com account, and they have to be downloaded. However, if you want to watch them on youtube, here's a spreadsheet with youtube links to all of the course videos.

- *Python:* There are too many resources on Python to list here. But here are a few:
  - For our "text" for this segment of the course, we are using a Python web development video series by Corey Schaffer. I have created my own videos emphasizing and explaining the features that we need for this course. In addition, I have created our own labs (with videos) which further explore the database-related features (and other cool stuff!)
  - An interactive web version of How to Think Like a Computer Scientist starts with pretty much the same basics as the Hands-on Python Tutorial, but in a somewhat different order with a different graphics library, and goes much further, and allows you to program totally inside the browser, and has embedded videos. There is also an older, somewhat different, non-interactive pdf version.
  - http://python.org Home site for the Python language, where you can find out more and download the latest production version starting with a 3 (3.8 in December, 2019). Caution: an *incompatible* 2.7 version may be listed first in the downloads.
  http://www.pythontutor.com/ A wonderful site where you run code in your browser step by step and save and email a URL reference to any step.
  - Extra Material on IDLE errors messages
  - An online interactive presentation with online exercises, covering pretty much what I do, though they do functions much later: http://cscircles.cemc.uwaterloo.ca/   They incorporate the pythontutor.com functionality referenced above. The page has a link to a large collection of videos, Python from Scratch.
  - https://groklearning.com/course/intro-python-1/ : Gentle Python intro, also totally in the browser.
  - http://en.wikibooks.org/wiki/Non-Programmer's_Tutorial_for_Python_3 Another introduction to Python basics in different words. No graphics, few major examples, lots of basic syntax.
  - Official Python 3 Tutorial *moves very fast for someone with no programming background*. It covers a lot, going well past our course!
  - http://codecademy.com step by step, but with *Python 2, not 3*.
  - Software Carpentry - Python is an intro for data scientists using the numpy library and the nice development/display environment ipython.
  - A long further list at http://wiki.python.org/moin/BeginnersGuide/Programmers
  - A very nice, surprisingly short book that covers many topics concisely: Mike McGrath, Python in Easy Steps.
  - You may want to experiment with PythonAnywhere, an online virtual machine environment!

- For Mongo, we are using some of the MongoDB website videos, as well as some publicly-available websites and example files.

Course Outcomes and Learning Objectives

Outcomes: Students will learn to design and implement a transactional relational database; to develop a web application to access and manipulate the database; and to query a NoSQL database. Students will understand the fundamental concepts of database design and implementation using both SQL and NoSQL

Learning Objectives:
- Learn fundamental principles of the relational model, normalization and functional dependencies
- Apply data modeling concepts and techniques to capture the conceptual model of an application
- Create and query a relational database, using SQL
- Implement a web database application (in this case, in Python), using a web development framework (in this case Flask) and an object-relational mapper (in this case flask-sqlAlchemy).
- Query a remote and a local NoSQL database.

Software (instructions and links for all software is detailed in the Orientation)

- MySQL/MariaDB (MariaDB is a clone of MySQL, at least a fairly close one for the time being), Apache web server (or some other local web server), and some way to interface with the database. The easiest way to handle this is to install a WAMP (or MAMP, for macs) stack. I am using XAMPP, and I have supplied detailed instructions on the Orientation.
- Python
- Flask
- Flask-sqlAlchemy
- Anaconda
- MongoDB
- Atlas free-tier hosting
- Compass (a GUI for MongoDB)

Academic Honesty

Students are expected to have read the statement on academic integrity available http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml. This policy applies to the course. The minimum penalty for academic dishonesty is a grade of F for that assignment. Multiple instances or a single severe instance on a major exam or assignment may result in a grade of F for the course. All cases of academic dishonesty will be reported to the department office and the relevant college office where they will be placed in your school record. Academic dishonesty includes, but is not limited to, working together on assignments that are not group assignments, copying or sharing assignments or exam information with other students except in group assignments, submitting as your own

information from current or former students of this course, copying information from anywhere on the web and submitting it as your own work, and submitting anything as your own work which you have not personally created for this course. If you do wish to use materials that are not your own, please check with me ahead of time and cite your source clearly. When in doubt, ask first! Be aware that I have changed the values for many for the textbook problems that are used for homework problems. For those problems that require open-ended answers, please be very careful to state the answers in your own words, not in the words of the Instructor's Manual, nor in the words of students who have previously taken this course.

Lateness Policy

Assignments are due as specified in the syllabus Course Schedule and on Sakai. Any extensions in due dates will be sent as email announcements on Sakai. In the rare event that I allow an individual student to submit an assignment late, it will be graded as half credit. **Some assignments have a "resubmit" date listed on the Sakai assignment. That is not the due date. That is only for students for whom I give permission to resubmit.**

Online Recording Policy

This is an in-person class,, and I will rarely (if ever) record student discussions. My lectures will be delivered in class and are also prerecorded. The three classes that I have to miss will be covered with an online substitute (Mr. Elliott Post), and those classes will be held in my zoom room, online and synchronously. Attendance will be taken. To encourage student participation and questions, and in deference to student preference not to be recorded, these session will also not be recorded. However, in the rare event of any discussions may be recorded, below is the official Loyola Recording Policy:

In this class software may be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. All recordings will become unavailable to students in the class when the Sakai course is unpublished (i.e. shortly after the course ends, per the Sakai administrative schedule: https://www.luc.edu/itrs/sakai/sakaiadministrativeschedule/). Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your professor. The use of all video recordings will be in keeping with the University Privacy Statement shown *__below__*:

Privacy Statement
Assuring privacy among faculty and students engaged in online and face-to-face instructional activities helps promote open and robust conversations and mitigates concerns that comments made within the context of the class will be shared beyond the classroom. As such, recordings of instructional activities occurring in online or face-to-face classes may be used solely for internal class purposes by the faculty member and students registered for the course, and only during the period in which the course is offered. Students will be informed of such recordings by a statement in the syllabus for the course in which they will be recorded. Instructors who wish to make subsequent use of recordings that include student activity may do so <u>only</u> with informed written consent of the students involved or if all student activity is removed from the recording. Recordings including student activity that have been initiated by the instructor may be retained by the instructor only for individual use.

Religious Holidays
Students with religious holiday conflicts: Please let me know within the first two weeks of class if you have a religious holiday conflict with any exam or homework due date, so that we can plan on an accommodation.

Students with Disabilities

Loyola University Chicago provides reasonable accommodations for students with disabilities. Any student requesting accommodations related to a disability or other condition is required to register with the Student Accessibility Center (SAC). Professors will receive an accommodation notification from SAC, preferably within the first two weeks of class. Students are encouraged to meet with their professor individually in order to discuss their accommodations. All information will remain confidential. Please note that in this class, software may be used to audio record class lectures in order to provide equal access to students with disabilities. Students approved for this accommodation use recordings for their personal study only and recordings may not be shared with other people or used in any way against the faculty member, other lecturers, or students whose classroom comments are recorded as part of the class activity. Recordings are deleted at the end of the semester. For more information about registering with SAC or questions about accommodations, please contact SAC at 773-508-3700 or SAC@luc.edu.

Students who are allowed to take their exams in the SAC office are encouraged to do so. *Should you choose to take the exam in the classroom, I cannot guarantee that the classroom environment will be quiet enough to provide you with the environment that your disability may require. If you choose to take the exam in the classroom, you are taking that risk.*

Students with Sponsorships and Scholarships

If you require a certain grade in order to satisfy a sponsor or a scholarship requirement, please be sure to monitor your grade on Sakai. I will consider only your performance in this course in calculating grades, using the grading rubric posted in this syllabus. If you cannot achieve a minimum grade that is required by a sponsor or a scholarship, I will not change your grade to help you meet that requirement. This would be unfair to other students, and not reflective of your performance in this course. You are responsible to monitor your grade and to keep apprised of the withdrawal dates posted by the registrar.

Course Components and Grading

- o *Lecture/Lab:* My lectures will be delivered in class and are also prerecorded. The three classes that I have to miss will be covered with an online substitute (Mr. Elliott Post), and those classes will be held in my zoom room, online and synchronously. Attendance will be taken. Labs for the first 5 weeks are not graded, but they provide a foundation for the homework for that week, which is graded. You will definitely want to complete them before working on the homework. The labs for the Python and the MongoDB parts of the course are graded. Lab-3-elemMatch for MongoDB is extra credit.
- o *Exam:* As of this writing, there is one exam, scheduled on October 19. It covers the material on the first six weeks (Database Design and SQL queries). If you must miss the exam, let me know well in advance. Then if you have a good reason we can possibly make other arrangements, at my discretion. I have little sympathy for people who inform me after the fact for no good reason. Exam absences will be verified. If they can't be verified, you will not be excused.
- o *Possible second exam:* If I am not satisfied with the performance and/or participation on the labs for the Python-ORM module of the course, then there will be a second exam, on that material. If there is a second exam, it will be announced at least two weeks before the exam will take place.
- o *Project:* There is a project, which takes the place of a final exam. You are required to build a web application that accesses a database that you will design. You are required to use the skills covered in the course (Python, SQL and ORM queries, etc.). You may use our sample programs as templates—in fact, I strongly suggest that you do). But you will have to design and implement CRUD for your own database application. Projects will be presented during the Final Exam time slot. I usually allow videos or zoom presentations instead of an in-class presentation. Online students present with video or zoom. The project will be discussed more in class. Project Overview (Requirements). Presentation Guidelines.
- o *Team Work:* For some assignments, and for the project, you will be allowed (or sometimes required) to work in a team. Full participation is required!! **Do not assume that if your team completes the assignment or a project that all team members will automatically be assigned the same grade.** For the project, I will check your GitHub site for commits, and I will gauge individual participation through team meetings with me (in class and via

zoom). For assignments, I will walk around the class meeting with each team and ask questions to assess your participation. At any point, I reserve the right to disband a team for an in-class assignment and require individual completion and submission.

Grading

The course is worth 1025 points. It will be graded on the basis of 1000 points. In addition, MongoDB Lab-3-ElemMatch is not required this semester, but is still available for 20 points of extra credit, so you can actually earn up to 1045 points (in effect, 45 extra credit points).   In the event that our pace does not allow us to complete everything listed, I will base the grade out of the number of points for the completed components that were actually assigned.

Course Component	Points	Course Component	Points
Orientation:		DB Design and Modeling:	
Tour of the Course and Syllabus screenshot	5	Homework #1	40
		Homework #2	50
XAMPP Orientation:		Homework #3	50
Screenshot of Server Installation	10	Homework #4	50
Screenshot of SQL Test Command	10	Python-Flask-ORM:	
Screenshot of terminal window	10	In-class-Lab-02-Templates	40
Python-Flask-ORM Orientation:		In-class-Lab-03-Forms	40
Screenshot of pip install flask	5	Homework-Lab-4a-connect	40
Mongo Orientation:		Homework-Lab-4-b (follow along)	40
		Lab-4c-culminating assignment	100
Screenshot of Atlas Cluster	10	MongoDB:	
Screenshot of terminal mongo commands	5	Lab 1a Questions, Compass	30
		Lab 1b Queries and text index	30
Exam on DB Design and Modeling	200	Lab 2a Local DB, citibikes query	30
Project	200	Lab 2b Aggregation	30

**Course Schedule. This schedule is subject to slight changes to accommodate student progress and interest.
Please also keep track of important dates (including withdrawal deadlines) on the Undergraduate and Graduate Academic Calendars.**

**VIDEOS LINKS: The video links shown in the Course Schedule can be downloaded from my personal box.com account.
Several students requested that I post them somewhere where they can be viewed online. So here is a google sheet with Youtube links where they are posted on youtube.**

Many, *but not all,* homework assignments are due on Tuesdays. Please check the due dates and plan your time accordingly!!

Week #	Week beginning	Topic/Text/Links	Videos	Assignments
Module #1: Database Design and SQL				
1	8/31	***Intro and ER Modeling*** • Administrative introduction, syllabus • **Chapter 1:** DB History, Motivation, basic terminology (lecture ppts) • Intro Overview: integrity, concurrency, SQL • **Chapter 2:** Schemas, DBMS, Architectures • Supplier-Parts: motivational example (actually references topics in Chpater 15.1 - 15.4) • **Chapter 3:** ER Diagrams. (PPTs) • Pilot-Plane Type (example with many flaws) • Use any modeling tool you want, even Word or PPT. But don't do that. BETTER: try Lucid (You can keep renewing the free trial); ER Assistant (Windows only); Gliffy; something like Draw.io (I don't prefer their EER notation, but no biggie); StarUML; ErDraw (ok EER notation) Dia (Windows or mac); try ERDPlus (seems cool and very clear! Good feedback from students. It doesn't support EER Diagrams, but if you map your extended ER constructs into regular ERD constructs, it can help you with mapping to relations and the DDL.) worst case, draw and scan into a pdf file--that is really a worst case. Yeah, don't do that.... • You can go another direction entirely, and use SQL Workbench as an alternative to PHPMyAdmin, and also for ERD design. You're on your own with that, but if you're comfortable with it, great. • *Discuss Orientation* test software installation on laptops. It's part of your Orientation points, which also	• 1.1 : Intro •1.2, 1.3, 1.4: Famous example Supplier/Parts • 1.5,1.6, 1.7, 1.8, 1.9: text PPTs (revised for lecture) •1.10: Pilot-PlaneType •1.11: Discussion of HW#1	Install XAMPP on your laptops, if you are using a laptop. Configure PHPMyAdmin, (possible issues), (You can use any WAMP, MAMP or LAMP stack, or you can use a VM on Guacamole if you request one. You can also choose to install the components separately. But I have supplied instructions to XAMPP, which works on Windows and Mac. Check the orientation assignments on Sakai.) Test your installation as per instructions on Sakai. You may also want to install SublimeText, atom, Brackets, BBEdit (or any good text editor) on the mac, or SublimeText, atom or Notepad++ on Windows Assign: Homework #1 Orientation: Best to complete before the course begins. Module 1 orientation due on 9/07 before class begins. However, you can have until 9/13 if you run into any problems. The lab on 9/07 will

		include testing PHPMyAdmin by creating a University database, and populating with this DDL and Insert file. For more detailed instructions and links, see Orientation.		require the installed components, so if you want to follow along, you will need to have everything installed before class.
2	9/07	• **Class to be held ONLINE for this week.** **Substitute: Mr. Elliott Post. He will review the ER Examples listed below, and answer questions on HW #1 (ERDs).** • Chapter 3: continue ER Examples: EN 3.21, 3.23, 3.32, 3.33, 3.34 begin SQL Simple SQL Queries (**based on Chapter 6,** but modified for MySQL) • *Lab #1:* see Company Schema using DDL(which had INSERT in it) to create and populate the database • useful links: copy and rename a DB in PHPMyAdmin and msqldbcopy or mysqldump for command line • Create and populate the Pine Valley database (ERD link). The video walks you through it, but here's the key. LoadBigData for Pine Valley, if instructed by video	•3.21, 3.23, 3.32, 3.33, 3.34 •Lab 1 Setup and DDL •Lab 1: Q1, Q2, Q3 parts of video misaligned, but still readable •Lab 1: Q4 – Q8 •Lab 1: Q9 – Q12 •Lab 1: Q14 – Q18 •Lab 1: Q19 – Q23 •Lab 1: Q24 – Q25 •HW #3 Instructions	**Due (9/09):** Homework #1 resolve any installation issues on stack Assign: Homework #3 (HW #2 is deferred to next week.) *Lab #1:* labs do not have to be submitted, as they are not graded. But you should complete them before working on the homework. You will need to complete the labs in order to be prepared for the exam!!
3	9/14	*EER Diagrams* • Chapter 4**:** EER Diagrams: Examples PPTs • Requirements Definition • **Chapter 9:** mapping ERDs to relations (PPT Slides 12-23) revisit the Supplier-Parts example • **Chapter 5:** relational model (formalize what you already know by now) (PPT slides)	•Chapter 4 PPT video goes along with the PPTs (It says Ch. 8, but ignore that) •Requirements Analysis •HW #2 Discussion the video discusses the "old" version of the homework. There is some overlap, and the concepts are the same. •Ch. 9 PPT Video •Ch. 5 PPT Video	**Due (9/13):** Orientation Tasks for Module 1 Assign: Homework #2 **Due(9/14) :** Homework #3

4-5	9/21-9/28	• **Class to be held ONLINE for these two weeks. Substitute: Mr. Elliott Post. Mr. Post will go through Lab #2 with you and help with installation issues for Module 2 (Flask). He will also answer questions on HW #2.** • ***Lab #2:*** More complex SQL Queries (**based on Chapter 7**, perhaps with some extra examples) user PVFC Big Version DDL, data1	•4.1: Design Guidelines4 •4.2: FDs and Keys •4.3: PPT Normalization •4.4: Normalization Example •4.5: Semantic Reconciliation •4.6: Equi-Natural-Joins •4.7: Outer Joins •4.8: Big Join •4.9: Self Join •4.10: Subquery •4.11: Correlated Subquery •4.12:Derived Tables	**Due(9/23):** Homework #2 *Lab #2:* complete before working on homework #4 Assign: Homework #4 Hints for HW4

6	10/05	• **Chapter 14: sections 14.1-14.4**, normalization and functional dependencies, brief overview PPTs
		    Please come prepared having watched all of the lecture
		    videos on normalization
		• Review for Exam!!
		• Time permitting:
		    • Examples of Advanced SQL (＂cheating＂ SQL):
		        • Case..when from w3schools website
		        • Rank (used with over and partition by)
		            o Over and Partition By (sliding Window frame)
		        • Subqueries everywhere!!
		        • Highly nested
		        • CTE (Common Table Expressions□temp tables)
		            o Simple example of With
		    These are not required for homework, labs or the exam, but may be used toward extra points for the project!! Also, just very cool, and some are based on actual queries done for actual companies!		

7	10/12	Mid-semester break!		
8	10/19	Exam (Midterm Review) Cool link: SQL Injection • Prepare for the next Module of the Course!! • Review the Python Setup Lab, complete the Flask Orientation Assignment. • Recommended: Complete the entire Python Setup Lab as early as possible. It is due next week!!		**Due(10/19):** Homework #4 **Due(10/23):** Flask Orientation Earlier is better!! In order to complete the orientation you will have to complete the Python-Setup Lab (parts due for Orientation; parts needed for remainder of the

				course). If you wait until the last minute, just use the VM.

Module #2: Database Web Application, using Python, Flask, mysqlAlchemy.				
Before beginning this module, please download Python-DB-Lectures-Labs.zip. For mac students using MAMP, use this link. For students using the VM, use this link. (Actually, it is already downloaded and unzipped on the VM, for students using the VM.) It includes an entire directory structure with the files that you need for this Module. I reference the appropriate files (with its file path) for each lecture/lab listed below.				
Videos will be linked to individually (not as a zip file)				
In general, find the files listed in the Topics column, and let the videos guide you as to what to look at or do.				
9	10/26	Intro and Setup for the web application • Reference: Setup and Code from original video (totally optional!): o Code: DemoApps/01-GettingStarted • Lecture: Review Setup and Code for getting started: o FlaskDemoLectures/GettingStarted (follow video with PPTs) You are not required to submit anything for this part, but if you follow along, this will get you up and running in Flask. • Review Lab Instructions for Setup (should have completed during Orientation. I listed this for review and reference.) o LabInstructions/1-Setup.pdf (not required to submit now)	• Overview • 1-Flask-Hello-World • Special video workaround in Anaconda for VM users	**Due(10/23):** Flask Orientation Python-Setup Lab
		Using Templates in Flask • For reference: Code from Original Application o Code: DemoApps/02-Templates • Lecture: FlaskDemoLectures/02-Templates (follow video) • In-class lab assignment: LabInstructions/Lab-1-2-Templates.pdf	• 02-Templates	**Due(10/26 in class or shortly thereafter):** Python Lab 1-2: Templates
10	11/02	Creating and using Forms: • For reference: Code from Original Application o Code: DemoApps/03-Forms-Validation-Final • Lecture: FlaskDemoLectures/03-Templates (follow video) o In-class lab assignment: LabInstructions/Lab-3-Forms.pdf • Project: Sign up for project teams(Sakai), begin selecting a topic Project Overview (Requirements). Presentation Guidelines.	03-Forms	**Due(11/02 in class or shortly thereafter):** Python Lab 3 Forms
11	11/09	Python connecting to a database. • First we cover simple connections, non-flask connections, and basic flask connections, not from our DemoApp. o Watch the video lab-connect-db • Complete Lab4-a before coming to class. o LabInstructions/Lab-4a-db-connect.pdf, using the files in the folder LAB-connect-db. Complete the parts in red.	• 04-DB (lecture on the DemoApp) • 04a-lab-connect-db	**DUE(11/09 before class, 5:00 p.m.):** Lab 4a-connect-db. Reminder: Lab 4-b is due next week *before* class. It simply involves following along with the first half of the lab.

		• We will review Lab-4a, and we will discuss Lab 4-b, and maybe start on it.		

12	11/16	**There is over an hour's worth of videos to watch before coming to class!!**
		
		# Please come to class prepared!!!
		
		Crud on your database, going way beyond the DemoApp original app
		• For reference: Code from Original Application
		  o Code: DemoApps/04-Database
		  o Code: DemoApps/05-Packages
		  o Code: DemoApps/08-CRUD
		• Lecture: FlaskDemoLectures: (follow video 04-DB) This is just a lecture on the original code of the original videos.
		  o Code: FlaskDemoLecture/04-DB
		• Lecture: In the folder DemoAppLabs, we will look at ALL of the code in that folder. Each app is a slight variation or improvement over the previous apps
		  o In-class lab (discussion, no submission): LabInstructions/Lab-4b-db-connect-CrUD.pdf. The lab instructions tell you exactly when to look at which project's code.
		• **Begin culminating assignment on Module #2 Lab 4-c You will have until class time of next week to complete Lab 4-c!!**
			• 04-DB (lecture on the DemoApp)
			• 04-DB-trySQL
			• 05-Packages (lecture)
			• 05-Packages-try-ORM-model-reflect
			• 06-bcrypt (brief explanations, just FYI)
			• 08-CrUD (lecture, not lab. Just watch.)
			• 08-CrUD-Choices
			• 08-CrUD-Update-Delete-New
				DUE (11/16 at 5:00 p.m. *before* class): Lab-4-b: Please watch the videos *before* coming to class. We will briefly review the lab and discuss any questions together in class. There is nothing new for you to do for this lab—you simply have to follow along and take a screen shot where indicated, but it is *crucial* preparation for your big assignment, which is lab-4-c!! Your homework requires that you complete the first part of the lab and take a screenshot. We will review the second part of the lab in class (although you are encouraged to complete that as well before class.)

13	11/23	• Catch-up, continue on Lab 4-b, discuss Project • Culminating assignment on Module #2: Lab 4-c. (Can also be found in the zip file: Lab Instructions/Lab-4c-Assignmnet-20-21) • Project Overview (Requirements). Presentation Guidelines.		Lab-4-c due 11/23 at 11:55 p.m. **Due(11/30):** Project Progress Report or Team Meeting **Due (11/30, 5:00 p.m.):** Mongo Orientation Labs Download MongoDB-Lectures-Labs.zip and *jupyter notebooks*

Module #3: Querying MongoDB   *Before beginning this module, please download MongoDB-Lectures-Labs.zip. I reference the appropriate files (with its file path) for each lecture/lab listed below. The MongoDB lectures and labs are fully supported by videos, and you are expected to work on them independently and come to class with any questions, using the "flipped" model that you have likely used in other CS classes. Class time will be devoted primarily to working on your projects.*

Lab 3-elemMatch is extra credit.
Team must meet with me. We can touch base on your progress during class "walkarounds". If you require more time, your team may set up a zoom meeting with me. A signup form will be posted as we get closer to this module.
In general, find the files listed in the Topics column, and let the videos guide you as to what to look at or do. Also download the jupyter notebooks that you will using for this part of the course. Place that folder in your MongoDB application folder for this course (my videos show mine as being Documents→mongdb-analytics, but you may have yours stored elsewhere).

14	11/30	Setup and Basic Querying: Lecture (watch the four lecture videos before class!!: • Make sure that you have completed the Mongo Orientation • Lecture: Follow the directions in the four lecture videos. It is strongly recommended that you duplicate the work shown in the videos • **Project Check (In person, and zoom meetings, if needed.)**	1-MDB-Atlas-Cluster 2-MDB-Import-Movies_initial 3-Install Compass 4-Connect-to-Atlas	**Due(11/30 at 5:00 p.m. before class):** Mongo Orientation Labs **Due(11/30):** Project Progress Report or Team Meeting

		• Lab: Complete MongoDB-Lectures-Labs/MDB-Lab-1a.pdf
		   o Complete the questions answered in red, and submit
		• Lab: Complete MongoDB-Lectures-Labs/MDB-Lab-1b.pdf
		   o Complete the questions answered in red, and submit the answers, and the screenshots as specified in the videos.
		• **Project Check (In person, and zoom meetings, if needed.)**
			• Lab-1-b-First Query
			• Lab-1-b-create-text-index
				Due(12/02): Mongo Lab-1a, Lab-1-b

15	12/07	Labs: MongoDB-Lecture-Labs/Lab-2-a-b-c-Student. Submit the required screenshots from Lab2a and Lab 2b. **Project Check (In person, and zoom meetings, if needed.)**	• 5-Aggregation Framework • 6-Filtering • 7-local-trips • 8-Project-reshape • 9-UpdatingDocuments • 10-Data-Types	**Due(12/08):** Lab-2a-2b There is no assignment submission for Lab 2c. It is optional.

		Lab 3: Open the notebook as specified in the lab instructions:
		       LabInstructions/Lab-3-student
		Complete the missing cells in the notebook
		Submit the screenshots of the completed cells
			• 11-FilteringOnArrayFields
			• 12-elemMatch
			  (example is already completed in the jupyter notebook 17-Elem-Match)
				Lab-3 is extra credit. Due on 12/10 if you choose to complete it.

		No lab for these topics. No assignments. I included if you are interested, and just because they're cool!	• 13-GeoSpatial • 14-Graphics	
16	12/14	Final Project Presentations (zoom, video, or final exam slot)	To be discussed in class	**Due(12/16):** Project