



# INFO7255 12884 Adv Big-Data App/Indexing

## [FALL 2024]

### Course Information

Course Title: advanced big data application and indexing

Course Number: info 7255

Term and Year: Fall 2024

Credit Hour: 4

CRN: 12884

Course Format::live streaming

### Instructor Information

Full Name: Marwan Sabbouh

Email Address: marwansabbouh@Gmail.com

Office Hours: Thursday evening at 7 PM by appointment

### Instructor Biography

Please insert a brief instructor biography here.

### Teaching Assistant Information

Full Name: Divya Shree ID, Shruti Milind Randive

Email Address:randive.s@northeastern.edu; shree.d@northeastern.edu

Office Hours:Click or tap here to enter text.

### Course Prerequisites

Please review the academic catalog to identify any course prerequisites

### Course Description

New data points are being generated at ever increasing rates. Traditional techniques based on relational databases to ingesting, storing, indexing, and analyzing the data are no longer sufficient to deal with the volume, variety, and velocity of new data points. The volume, variety, and velocity of new data points are creating bottlenecks at every stage of the processing chain. This course will present Big Data architecture for building distributed software systems. At the outer endpoint of the distributed system, there is a need to quickly validate the incoming data so as to maintain data quality. When storing the data, write latency can never exceed the tens of milliseconds for any real world application with a healthy user base. When indexing the data, the indexer throughput rate must be high enough to keep up with velocity increase of the incoming data. The indexing technique must support logical operators, wildcards, geolocation, join, and aggregate queries. Once the data is stored and indexed, we are faced with other challenges related to near real-time predictive analytics. The issue for near real time analytics is how quickly we can take advantage

of new data points after they are stored in the system to answer a question. This requires that the duration of the workflow required to ingest, store, index, and analyze the data be kept to a minimum. Even after all these requirements are met, there is one additional requirement. The above system must be schema less. That is, the system must support extensibility of its own data models and the addition of new data models without any new programming.

### Course Learning Outcomes

Develop students understanding in Big Data architecture and applications

Become fluent in technologies relevant to big data

Develop students architecture thinking

### Required Tools and Course Textbooks.

Online materials will be provided in the class.

**Course Schedule/Topics Covered.** Please insert what is applicable for your class using the below table. See sample provided below and adjust according to your schedule

Week 1: September 7, 2024	Introduction to Big Data architecture
Week 2	Strongly typed data protocols
Week 3	Key value stores& Rest APIs
Week 4:	Json as Graph
Week 5: October 5, 2024	Prototype demo 1
Week 6	Securing rest API
Week 7	Oauth 2.0
Week 8	Search Part 1
Week 9 : November 2, 2024	Prototype demo 2
Week 1	Search part2, Queuing
Week 12:	Introduction to GraphQL
Week 13:	Selected Topics
Week 14: November 30	Thanksgiving holiday, no class
Week 15: December 7, 2024	Final Prototype demo
Week 15 : December 14	Final exam

### Assignment Grading

Please insert all assignment grades and weights for the course. Example below:

- Attendance – 3 %
- Assignment 1 – 5%
- Assignment 2 – 25%
- Assignment 3 – 41%
- Final Exam – 26%

### Grading Scale

95-100% A	87-89.9% B+	77-79.9% C+	69.9% or below F
	84-86.9% B	74-76.9% C	
90-94.9% A-	80-83.9%B-	70-73.9% C-	

## Attendance/Late Work Policy

### Attendance Policy

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed **a maximum of 2 absences per course, with 3 or more absences resulting in an automatic 'F' for that course.** Students are expected to inform their instructors of any absences in advance of the class; if a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak with their Academic Advisor ([coe-mgen-gradadvising@northeastern.edu](mailto:coe-mgen-gradadvising@northeastern.edu)) to learn more about the Medical Leave of Absence. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave in accordance with the University's academic and global entry expectations. International students should review the Office of Global Services webpage to understand their visa compliance requirements.

Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

### Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

## End-of-Course Evaluation Surveys

Your feedback regarding your educational experience in this class is particularly important to the College of Engineering. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at <https://neu.evaluationkit.com>. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your Northeastern University Mail account notifying you when surveys are available.

## Academic Integrity

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind

according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to <http://www.northeastern.edu/osccr/academic-integrity-policy/> to access the full academic integrity policy.

### **MGEN Student Feedback**

Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: [https://neu.co1.qualtrics.com/jfe/form/SV\\_cTIAbH7ZRaaW0Ki](https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaW0Ki)

### **University Health and Counseling Services**

As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit <https://www.northeastern.edu/uHCS>.

### **Student Accommodations**

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit <https://drc.sites.northeastern.edu>.

### **Library Services**

The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for education specific resources, visit <https://library.northeastern.edu>  
Network Campus Library Services: [Northeastern University Library Global Campus Portals](#)

### **24/7 Canvas Technical Help**

For immediate technical support for Canvas, call 617-373-4357 or email [help@northeastern.edu](mailto:help@northeastern.edu)

Canvas Student Resources: <https://canvas.northeastern.edu/student-resources/>

For assistance with my Northeastern e-mail, and basic technical support:

Visit ITS at <https://its.northeastern.edu>

Email: [help@northeastern.edu](mailto:help@northeastern.edu)

ITS Customer Service Desk: 617-373-4357

## **Diversity and Inclusion**

Northeastern University is committed to equal opportunity, affirmative action, diversity, and social justice while building a climate of inclusion on and beyond campus. In the classroom, members of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration, and an awareness of global perspectives on social justice.

Please visit <http://www.northeastern.edu/oidi/> for complete information on Diversity and Inclusion

## **Title IX**

*Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.*

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty, and staff.

In case of an emergency, please call 911.

Please visit <https://www.northeastern.edu/ouec> for a complete list of reporting options and resources both on- and off-campus.