

Course Syllabus



Syllabus

Course Information

Course Number: CS610

Course Title: Data Structures and Algorithms

Faculty Contact Information

Instructor: Ali Mili

Email: mili@njit.edu (<mailto:mili@njit.edu>)

Office Hours/ Live session: Fridays 4:00-5:00 PM. to be confirmed.

link:

<https://njit.webex.com/njit/j.php?MTID=m7fd6db566f67d32e5c7783ca32626624>

CS610 tutoring:

Monday 2pm to 7pm,

Wednesday 2pm to 7pm

Course Description

This is a graduate-level course on data-structures and algorithms, with an emphasis on algorithm design techniques and analysis of algorithms. Introductory topics include analysis techniques, worst-case and average-case analysis, induction, recursion, recurrence relations, and divide-and-conquer design technique. Advanced topics include priority queues, hash tables, binary-search trees, balanced search trees (AVL trees), sorting algorithms, as well as other design techniques such as greedy-method and dynamic-programming, graph algorithms, and text processing algorithms.

Textbook and Materials

- Goodrich, M. & Tamassia, R. *Algorithm Design and Applications*. John Wiley and Sons, Inc., 2014, ISBN 978-1-118-33591-8

Course Outcomes

- Students will be able to assess and analyze algorithms.

- Students will be able to implement various problem solving techniques.
- Data modeling / data representation.
- Fundamental algorithms (optimization).

Assessments

There are seven assessments throughout the course: three text assignments (6 points each), three programming assignments (9 points each), a midterm exam (20 points), and a final exam (35 points).

Refer to the *Schedules and Deadlines* page for information regarding due dates, and the individual course pages for assignment and exam details.

Grading Scale

Grade	Percentile	Percentage
A	4.0	90-100%
B+	3.5	85-89.99%
B	3.0	80-84.99%
C+	2.5	70-79.99%
C	2.0	60-69.99%
F	N/A	< = 59.99%

Please note: This table is given as an approximate guidance; the instructor reserves the right to depart from it significantly (mostly for the benefit of the students), depending on the grade distribution of the class.

Course Structure

Chapter number	Week
1: Algorithm Analysis	Jan 16
2: Basic Data Structures	Jan 23
3: Binary Search Trees	Jan 30

4: Balanced Binary Search Trees	Feb 6
5: Priority Queues and Heaps	Feb 13
6: Hash Tables	Feb 20
8, 9: Sorting and Selection	Feb 27
Midterm Exam	Mar 6
Spring Break	Mar 13
10: The Greedy Method	Mar 20
11, 12: Dynamic Programming	Mar 27
13: Graphs and Traversals	Apr 3
14: Shortest Paths	Apr 10
15,16: Graph Algorithms	Apr 17
1,16: Revision	Apr 24
Final Exam	May 8

Grading Categories

Categories	Points per assignment	Percentage
Textbook Assignments	6 points	18%
Programming Assignments	9 points	27%
Midterm Exam	100 points	20%
Final Exam	100 points	35%

Time Commitment

The students are expected to allocate ten hours per week to study and work on the assignments for this course.



Course Policies

All correspondence with the instructor will take place through Canvas. Questions of general interest should be posted on Canvas' *Ask the Instructor* discussion board. Personal/ individual questions should be emailed if the instructor is not responsive to your discussion board posting. If you do so, please start your subject header with the sequence "CS610: Spring 2023".

Submission Deadlines

All assignments are due by 11:55 p.m. ET (unless otherwise noted) on the dates designated in the Schedule and Deadlines page.

Programming Assignments

Programming Assignments must be completed in either JAVA, Python or a C variant (C, C++, C#). Java freeware can be downloaded at <http://java.com/en/download/manual.jsp> (Links to an external site.)  [_ \(http://java.com/en/download/manual.jsp\)](http://java.com/en/download/manual.jsp) for Linux, Mac OS X, Solaris and Windows based machines. For those using C variant languages on Windows, Microsoft Visual Studio 2012 Professional can be downloaded through NJIT's IT department (<http://ist.njit.edu/software/download.php> (Links to an external site.)  [_ \(http://ist.njit.edu/software/download.php\)](http://ist.njit.edu/software/download.php)). Those using C variant languages on other operating systems should VPN into NJIT's Public Computing Site using their UCID to use required programs.

Students must include useful documentation within their program. Programs must run on either a Linux, UNIX, or Windows based machine. Source code will be uploaded to Moodle by the due date. The uploaded assignment should contain the following:

- Textbook assignments will be submitted through canvas in pdf format.
- Programming assignments will be submitted through afs directories that we will set up to that effect. The grader will run your program on the sample data provided for guidance, but may run your program on other data as well.

Late Work and Make-Up Exams

No late homework will be accepted. In case of missing an exam, a make-up may be taken only after providing written documentation to the Dean of Students. The Dean of Students will then inform the instructor about their decision. **Please be advised that no homework or programming assignment will be accepted or graded unless it is submitted on time and through Canvas.**


Sharing Information

Students are free to discuss assignments with their colleagues. However, they should not take any written (electronic or otherwise) record away from the discussion. This applies when the assignment is supposed to be an individual effort or whenever two teams discuss common problems they are each encountering (inter-group collaboration). After the discussion, it is advisable to engage in at least half hour of non-course related activity before starting to work on the assignment. This will assure that students are able to reconstruct by themselves what they learned from the discussion.


Student Conduct

The NJIT University code on academic integrity, found at <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf> (Links to an external site.)  (<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>), will be followed in all courses.


Student with Disabilities Codes

Appropriate accommodations are provided at no cost to the student. If you have any questions or would like additional information, please contact Dr. Phyllis Bolling, Center for Counseling and Psychological Services (C-CAPS), Campbell Hall, (entry level), room 205, (973) 596-3420. For further information, visit the [Disability Support Services \(Links to an external site.\)](http://www.njit.edu/studentsuccess/disability-support-services-0/)  (<http://www.njit.edu/studentsuccess/disability-support-services-0/>) website.

Technical Support

For assistance with the following items, please contact NJIT IST Service Desk at: 1-973-596-2900 or <http://ist.njit.edu/servicedesk/> (Links to an external site.)  (<http://ist.njit.edu/servicedesk/>)

- UCID
- Library database access
- Webmail by Google email system
- Sessions
- Password assistance*
- Content within this course
- Assignments
- Discussion Forums
- Quizzes
- Exams
- All other items related to the running of this course

*NJIT passwords may be changed using the [Global Password Change echanism \(Links to an external site.\)](https://mypassword.njit.edu/cgi-bin/upr/passchange_default.php)  (https://mypassword.njit.edu/cgi-bin/upr/passchange_default.php). You will need to know your current UCID and UCID password. Questions can be referred to 973-596-2900. Periodic changing of passwords and strategies for managing them are best practice for anyone using a computer. All members of the university community are encouraged to review [tips for password](#)


[management \(Links to an external site.\)](https://ist.njit.edu/strong-password-management/)  [\(https://ist.njit.edu/strong-password-management/\)](https://ist.njit.edu/strong-password-management/) and to change passwords regularly.

Software and Hardware Requirements

Sometimes, you will be required to use Word processing and presentation software, such as MS Word and PowerPoint found in Microsoft Office. You will also need to be comfortable with various aspects of using the Internet such as:

- Search engines
- Newsgroups
- E-mail
- Ability to download files

To view certain media elements in this course, you will need to have several browser plug-ins such as Shockwave, Flash, and Adobe Acrobat on your computer. Use the links in the course to download and install the appropriate software application.

Important: With regards to plug-ins, ensure you are using the most recent version of each plug-in you require. View the [hardware and software requirements \(Links to an external site.\)](http://ist.njit.edu/fall2017-recommended/)  [\(http://ist.njit.edu/fall2017-recommended/\)](http://ist.njit.edu/fall2017-recommended/) for this course.