New Jersey Institute of Technology

Digital Commons @ NJIT

Spring 2023

CS 610: Data Structures and Algorithms

Alexandros Gerbessiotis

Follow this and additional works at: https://digitalcommons.njit.edu/cs-syllabi

NJIT

New Jersey's Science & Technology University

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Course Syllabus: **General Information**
Page 1   **Document 1**

1.1 CONTACT INFORMATION

Instructor:	Alex Gerbessiotis
E-mail:	`alexg+cs610@njit.edu`
Tel:	(973)-596-3244
Office:	GITC 4213, 4th floor
@NJIT "Office" Hours:	Mon/Tue/Wed 10-10:40am, Wed 4:10pm-4:50pm
Assistant:	Check course web-page
Class Hours/Place:	See Registrar's course schedule
LMS:	Learning Management System to be used is canvas.njit.edu
Web-Page:	`http://www.cs.njit.edu/∼alexg/courses/cs610/index.html`
Web-Page:	`http://web.njit.edu/∼alexg/courses/cs610/index.html`

1.2 COURSE ADMINISTRATION

CourseWork: 2 exams, 5 Homeworks (HW), Programming project (PrP); Verification of Presence (VoP).
Points: 1020points=PrP(130)+Ex1(360)+ Ex2(360)+HW(150)+VoP(20)

HW: Five homeworks due **before 12 o'clock noon i.e. 12PM for Canvas** and submission through canvas.njit.edu; see Calendar Sec. 1.4. for dates and Appendix 1 for further information.

PrP: A programming project is 130pt. **Canvas submission per Document 3 guidelines BEFORE 12-o'clock noon (canvas calls it 12PM)**; date specified in the Calendar Section 1.4.

Exams: See Appendix D.2 and also Document P in canvas Announcements. Dates in Calendar 1.4. Exam 1 (midterm) in classroom 120min; Exam 2 (final) where and when as specified by the Registrar 120min. Both in paper, closed everything and cumulative. A math calculator is allowed but is a waste of time! A student who leaves the exam room before the preannounced departure time and without explicit permission by the instructor gets a 0 in the exam. *In case NJIT declares an emergency (e.g. Covid), an exam will become, time permitting, a canvas exam using ProctorU Record+ for proctoring. You are thus expected* **before 18:00 of the 3rd Friday of the semester** *to either acquire ProctorU credentials or check your existing credentials that still work for NJIT, and also test that your equipment still works with the ProctorU setup. Hopefully this option will not be exercised. But you and I should be prepared for the possibility of using it!*
NJIT computer policies: https://ist.njit.edu/student-computers.

1.3 BASELINE COURSE SYLLABUS

Course: CS610. Data structures and algorithms.

Credits: 3 credits.

Prerequisites: (CS114 and CS241) or equivalently (CS505 and CS506) or equivalent.

Description: Intensive study of the fundamentals of data structures and algorithms. Presents the definitions, representations, processing algorithms for data structures, general design and analysis techniques for algorithms. Covers a broad variety of data structures, algorithms and their applications including linked lists, various tree organizations, hash tables, strings, storage allocation, algorithms for searching and sorting, and a selected collection of other algorithms.

Textbook: [Recommended, designated] Algorithm Design and applications. M. T. Goodrich and R. Tamassia. Wiley, 2014, ISBN 978-1-118-33591-8
Referred to hereafter as **GT.**

NJIT
New Jersey's Science & Technology University

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Course Syllabus: **Outcomes and Topics**
Page 2   **Document 1**

Learning Outcomes:

1. Learn how and be able to understand and formulate the input-output relationship of computational problems, and formulate the requirements, data and operations of abstract data types (ADT).

2. Learn how and be able to asymptotically compare functions using $o, O, \omega, \Omega, \Theta$, and be able to solve recurrences using the master, iteration/recursion tree, and the substitution methods.

3. Learn how and be able to describe, derive and determine, the asymptotic performance of algorithms for computational problems and operations on elementary and more advanced data structures.

4. Learn how they operate and be able to understand fundamental algorithms and data-structures, and understand their characteristics for problems related to searching, sorting, selection, operations on numbers and polynmials and matrices and graphs. Be able to choose among a variety of similar ones based on problem/program specification and requirements.

5. Learn how and be able to compose more complex algorithms using as building blocks the fundamental algorithms introduced in class.

6. Learn how and be able to compose more complex algorithms using the algorithmic design techniques introduced in class.

7. Learn how and be able to compose advanced data structures using as building blocks the elementary data structures introduced in class.

8. Learn how and be able to implement in a high-level imperative language some of the algorithms and data structures introduced in class in the form of a programming project of considerable complexity.

9. Learn how and be able to understand and possibly identify that some problems are complex and are not susceptible to 'easy' solutions. Learn how and be able to understand the benefits and complexities of using randomness in computation.

Topics (with references to chapters of the designated textbook):

T1. Ch1-1.1.4,1.2-1.3,2.1-2.3,12.2-12.3: Introduction. Algorithm Analysis. Asymptotic notation. Sorting.Algorithm Design Techniques. Elementary data structures.

T2. Ch1.1.4-1.1.6, 11.1: Asymptotic growth of functions; Recurrence relations.

T3. Ch1.4,2.3-2.4,7.1-7.2:Graphs and their representation. Traversals.UnionFind.

T3. Not in GT:Web-page Ranking: Google's PageRank, Kleinberg's HITS algorithm.

T4. Ch6-6.3: Hashing (by chaining and open-addressing).Google Example.

T5. Ch 5-5.5: Heaps and Priority Queues.Greedy Method.Huffman codes.

T6. Ch8.2-8.3,9.1, 10.3: QuickSort. Complexity of sorting. Linear-time sorting.

T7. Ch 9.2, 9.3: Selection; Order statistics

T8. Ch 13, 14, 15: Graph Searching (DFS, BFS). Strong connectivity. Topological sorting. Shortest paths on graphs. Minimum cost spanning trees.

T9. Ch 11.2-11.3, 12.1: Integers, Polynomials, Matrices. Complexity issues: WORD, BIT, SLP models.

T10. Ch3-3.1, 4-4.2: Binary Search Trees (BST) and Balanced BSTs: search trees of bounded height.

T11. Ch20-20.3: Search Trees of Bounded Depth (and height)

T12. Ch23-23.4: String and Pattern matching algorithms (if time permits).

T13. Ch17.1-17.2.1: Theory of NP-completeness: P, NP, co-NP, NPC, NP-hard.

NJIT
New Jersey's Science & Technology University

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Course Syllabus: **Calendar**
Page 3   **Document 1**

1.4 CALENDAR

		Spring 2023	
Week	Tue	Out	In/Comments
W01	01/17	HW 1 out on 01/17	
W02	01/24		VoP in 1/29 before noon
W03	01/31	HW 2 out on 01/31	HW1 in 1/31 before noon
W04	02/07		
W05	02/14	HW 3 out on 02/14	HW2 in 02/14 before noon
W06	02/21	HW 4 out on 02/21	HW3 in 02/21 before noon
W07	02/28		HW4 in 02/28 before noon
W08	03/07	**Exam 1 on 03/07 in classroom**	
W–	——		SPRING BREAK
W09	03/21	HW 5 out on 03/21	
W10	03/28		
W11	04/04		Mon 3 APR: WithdrrawalDay
W12	04/11		HW5 in 04/11 before noon
W13	04/18		PrP in 04/18 before noon
W14	04/25		Last day of classes
W–	FRIDAY	NJIT follows a Friday Schedule on Tue	
W15	04/21	**Exam 2: Check Registrar**	

Any modification/deviation from the calendar and its items will be done in consultation with the attending a class students and be posted on the course web-page. It is imperative that students check the course web-page regularly and frequently. Exceptions are as announced by the Provost's Office.

1.5 COURSE POLICIES

OARS: If you need special accommodations, contact the Office of Accessibility Resources and Services, KUPF 201, to discuss your specific needs. A Letter of Accommodation Eligibility from OARS authorizing your accommodations will be required and should be received by us at least two weeks plus two days before the first exam, if it also relates to a ProctorU exam, otherwise seven days before the first non ProctorU exam.

MISSING: If you miss a class, you make up for lost time. No PrP extensions for any reason, medical or otherwise; submit early. If you miss an exam you MUST CONTACT the Dean of Students (DOS) within 2 working days from the day the reason for the absence is lifted with all necessary documentation and send an email of your intent and absence. Do not submit documentation to the instructor: it is a private matter between you and the Dean of Students. The maximum accommodation period will be the number of missing days to the exam date: it is imperative then that you contact DOS even before the 2 working day period has expired if the accommodation period would be shorter. For Exam1, a DOS approval will get you a scaled Exam2 grade for Exam1. No makeup exam for a ProctorU exam.

Canvas Note: Canvas assigns points to non CourseWork. Ignore canvas grades aggregations. Because canvas has synchronization issues, point-assigned material released through canvas will be of limited availability and visibility. **Make backups if needed (e.g. take screenshots).**

NJIT
New Jersey's Science & Technology University

A. V. GERBESSIOTIS
CS610
Spring 2023 | January 05, 2023
Course Syllabus: | **Course Policies**
Page 4 | **Document 1**

1.5 COURSE POLICIES (continued)

Grading: For paper exams if you use pencils to write down your answers do not complain about grading AFTER the EXAM. No Scratch paper. Work submitted will be graded for clarity, conciseness and correctness: be brief and to the point. Material covered in class and appearing in the relevant notes and chapters of the designated textbook can be used without proof. Everything else requires a proof (justification). For PrP-grading see Document 3 (Testing and Grading).

Grades: Check marks and report errors promptly. **Resolve any issues WITHIN 2 CALENDAR WEEKS and before the first Reading Day** starting from the day an exam or homework is released or returned. For PrP or the final, within 3 calendar days from the day grades are posted on canvas or Banner. Talk to the grader first, and then to the instructor. The final grade is decided on a 0 to 1000 point scale. Assuming no violation of the Collaboration policy: 820-850 points or more is an A, less than 500 points is F, and thus 500 points or more is C or better.

Incomplete: A grade of I(incomplete) is given in rare cases where work cannot be completed during the semester due to documented long-term illness or absence (e.g. unexpected national guard duty). A student needs to be in good standing (i.e. passing the course before the absence). An email (in lieu of a written letter) with a timeline of what is needed to be done will be sent to the student and the Department Chairperson. Not showing up in the final will probably get you an F rather than an I.

Collaboration: Collaboration of any kind (in HW, Exams, PrP) is PROHIBITED. Students must turn in work that has fully been composed and written by them and no-one else. Finding an answer on the Internet, Web, on a piece of paper, or otherwise, or it is product of someone else's work, or it is (partly or fully) common with another student submission, in the same or other section/course risks punishment as outlined by the University. All parties of such interaction receive a 0 and letter grade is lowered by one or two levels. The work you submit must be the result of your own mental effort.

Devices: Power down (equivalent to removing battery) and switch off (not just silence) mobile and other devices including wearables (e.g. iwatch) and place them in a zippered bag or zippered backpack or on the floor screen facing down. (See article XI, student contact code.) **IF A STUDENT GETS CAUGHT TOUCHING SUCH A DEVICE (on or off) during an exam, the exam receives a 0. DEVICES MUST BE OFF and NOT ON YOU. For ProctorU exams "ON YOU" means anywhere viewable including at a distance of less than 6ft. A not completely powered down device of yours is assumed to be "ON YOU" independently of proximity.** Note that the use of a device without the express permission of the instructor is considered cheating (Article XI).

Email/SPAM: Use an NJIT e-address to send email to the course email address (Appendix G).

Provost "Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/poli cies/sites/policies/files/academic-integrity-code.pdf. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/ or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu." Also, the following link is provided http://www5.njit.edu/provost/sites/provost/files/lcms/docs/Best_Practices_related_to_Academic_Integrity.pdf

The NJIT Academic Integrity Code will be upheld with violations reported to the Dean of Students. ■.

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Appendix A: **Course Delivery**
Page 5   **Document 1**

A   Course Delivery

Delivery in this course is through

(1) Lectures explaining TEXTBOOK content and optional instructor's typewritten notes **Subjects**.

(2) The canvas LMS.

(3) A course web-page (CWP).

(4) Email (webmail, not canvas messaging).

(5) Other supplementary material (handwritten notes of the instructor used in class).

A.1   Lectures on Subjects

Lectures delivered in class are based on the textbook and supplemented by instructor typewritten notes, known as **Subjects** that might contain typos so read them cautiously. Handwritten notes used in class by the instructor are also provided but might not be followed faithfully in class.

A.2   Canvas

The URL (Uniform Resource Locator) of the LMS is `canvas.njit.edu`. Access requires myUCID credentials (login, password). Renew credentials NOW if they are to expire during the semester.

A.3   Course web-page

`http://www.cs.njit.edu/~alexg/courses/cs610/index.html`
The course web-page (CWP from now) is split into three sections: A (Announcements, different from canvas Announcements), B (Public Information), and C (Other). Section C requires credentials that are common to all students. For login use `cs610` and password use `dsa2023`

A.4   Course email: webmail

The course email address is `alexg+cs610@njit.edu`. Read the email protocol used in the course FAQ (Appendix G): we then respond within one working day to such an email or faster. Do not use canvas messaging or canvas email; it is rarely read and is not NJIT sanctioned: your email will be lost.

A.5   Supplementary material

In emergencies Webex Recordings would be made available in canvas Modules. Kaltura voiceovers might be made available for material not in the textbook and in the PrP, but NJIT plans to drop Kaltura during the summer of 2022 so this is speculative.

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Appendix B: **Course Structure**
Page 6   **Document 1**

New Jersey's Science &
Technology University

B   Course Structure

1. Textbook information is available on page 1.

2. Subjects are supplemental typewritten notes authored by this instructor. They provide detail not found in the textbook for some topics. Some prerequisite material (Discrete Math) is very briefly listed for the sake of completeness and to provide definitions when needed. The cover page of a Subject indicates the chapters of the designated textbook it draws from.

3. Practice Problem Sets (PS). Most Subjects have a matching problem set (eg Subject 1 has PS1) that contains practice problems (past homework and exam problems) with solutions or hints of a solution. The PSs are in canvas Modules at the very bottom of the scrollable area there.

4. Homeworks in canvas. A Homework (HW) is for credit and set-up as an untimed, limited availability canvas Quiz, with no more than three attempts to submit but only the LAST ATTEMPT graded. A HW is due before noon (12 o'clock noon which is canvas's 12PM) on a day specified in the Calendar. See Document P for canvas Quiz terms.

5. Programming Project. Assignments. A Programming Project is for credit in this class. A grave mistake students make is to not follow the directions of Document 3 and a worse mistake is to never test their intended submission on an NJIT *NIX machine. Furthermore, programming assignments are given: they are not for credit and are not graded. Practice makes better.

6. Verification of Presence (VoP).

It will be set up as a canvas Quiz. You first download and read the syllabus including the Appendix's first and last pages. After you read them taking the VoP quiz wont take more than a minute of your time.

The VoP would become available 1 hour into the first class through noon time (12 o'clock noon i.e. 12PM) of the second Sunday of the semester. Submissions will be verified during morning hours on a Monday, Wednesday and Friday ONLY.

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Appendix C: **Class Structure**
Page 7   **Document 1**

C   Class structure

C.1   BEFORE A CLASS

- Anticipate what will be covered in that class. (We provide guidance before the first class.)
- Study the relevant sections of the designated textbook along with the relevant Subject.
- Prepare questions to ask. Keep notes.

C.2   DURING A CLASS

- Relate the material covered in class with the studied material. If the emphasis in class is on different topics than your prior study of the material, mark topics for a follow-up review.
- Ask questions. We learn from mistakes! Keep notes.

C.3   AFTER A CLASS

- Review the material covered in class. Write-down all computational problems introduced and all algorithms with their data structures described in class and their properties (eg running time). Implement them to understand them better. Practice makes perfect!
- If there is a PS for the Subject, practice with it. If there is a HW, do it!

C.4   Before FIRST CLASS of the semester

```
Download and Read    Document 1 (this document)
Download and browse Document 2 sections related to prerequisite knowledge.
Download and browse Subject  1 (Review prerequisite material).
```

D   Authentic assessment

D.1   Homeworks

There are Homeworks given for some credit. Your work is assessed by a grader or by canvas itself. The turnaround time for Homeworks is one week. Solutions are provided in the form of feedback you receive in canvas; a solution key is provided either in canvas Announcements or in Section C of the CWP. After grading, a canvas Homework becomes available for inspection for two weeks. After that two-week period it would be inaccessible. Take screenshots for your records.

D.2   Examinations

See also page 1 of this document and also Document P. There are two Examinations throughout the semester.

By default, all Exams in this class would be paper-based Exams and are cumulative. The Exam room would be the classroom, unless the Registrar decides otherwise (eg. final exam). Exam 1 is the midterm exam, and Exam 2 is the final exam. They have the same duration and are worth the same number of points.

If NJIT declares an emergency, an exam will be setup us as acanvas Quiz with proctoring through ProctorU Record+. For this you need to obtain ProctorU credentials within the timeline described on page 1. If you do not do so, expect a zero in the resulting exam. Canvas orientation for students or Docuemnt P discuss canvas exam taking and also discuss ProctorU Record+ in conjunction with canvas Exam taking. It also provides a practice ProctorU Record+ exam.

D.3   Canvas LMS

Rule of thumb: If it is not in CWP (course web-page), then it will be in canvas.
The following areas of canvas will be utilized. Do not use other areas, even if canvas populates them with information.

- **canvas Announcements**. Contains mainly announcements generated prior to the first week of classes. Afterwards, check the Announcement Section of the CWP, or as directed.
- **canvas Modules**. One canvas module per Subject.
- **canvas Assignments.** The Programming Project (PrP) area. Intended for you to upload your work per Document 3 guidelines. Additional programming assignments posted but they are not for credit.
- **canvas Quizzes**. There you will find Homeworks, the Verification of Presence (VoP), and in covid emergencies an Exam. The Quiz area is where you provide answers to them.
- **canvas Grades**. Grades for HWs, the PrP, and Exams (in case of emergencies) would be made available there. Do not trust canvas aggregations of grades. We keep records outside of canvas, and if your grade gets upgraded the change might not be reflected in canvas.

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Appendix E: **Technicals**
Page 9   **Document 1**

New Jersey's Science &
Technology University

E   Technicals

a. Screen Capture. If you plan to do screen capture you may use Microsoft's snipping tool or other similar tools. Export in .JPG. You may then include those files into a Microsoft .docx document. Capture only the relevant area and make sure information is viewable afterwards. (This matters for you to keep overall file size at less than 5,000,000B.)

b. PDF generation. There is a PDF printer driver in Microsoft Word that can be used to convert the resulting document in PDF. (I believe that Pages in OSX offers something similar.)

c. File size limitation. If there is a requirement to submit a file be considerate: 5,000,000B is the limit. Include your name info and last four digits of NJIT ID in every document you submit.

d. VPN. If you connect to an NJIT computer from outside NJIT (eg using ssh), you need to establish prior to this connection a VPN connection (eg your home-based PC will have an NJIT IP address). Our suggestion is for you to work inside NJIT and thus to avoid the use of VPN completely. But an NJIT supplied VPN client is available at `https://ist.njit.edu/vpn/` or type in Google `NJIT VPN client` and follow through the instructions/links.

e. Linux and Highlander *Nix Sometimes we might ask you to work on a linux machine. They used to be called AFS machines, now they are called Higlander *nix machines. If you know nothing about the Linux operating system and its command line-based commands, go to the course web-page and Section B3 has links (URL) to tutorials that can help you. Such AFS machines (btw, AFS stands for Andrew File System, a network-based global file system) are located at GITC (2nd floor) and have names such as oslX.njit.edu or oslXY.njit.edu where X, Y are numeric digits. Machines osl1.njit.edu through osl31.njit.edu should be accessible most of the time. You may find there a document that describes how to use Mobaxterm on a windows machine to connect to an AFS computer.

f. File extensions: .tar and .zip . If you need to pack files as a tar or zip file do so using the command line on a *nix machine and command line directives. You may find some information in Section B3 of the CWP.

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Appendix F: **Miscellanea**
Page 10   **Document 1**

F   Miscellanea

F.1   NJIT ID

Login to `my.njit.edu` and navigate around. If you click on your name (with Javascript enabled) which is on the left of Sign out, which by itself is on the top right area of a window, you might see your full NJIT ID. Otherwise locate your personal information there.

F.2   Attendance

You are not required to attend a lecture (class). It is however strongly recommended that you attend class; students who drift away from the classroom, do not do as well as students who are in the classroom. If you are absent you need to study the material from the textbook and the associated notes (Subjects) and must definitely do the problems of the PSs (Problem Sets) prior to doing a Homework. Topics not covered in a Homework are covered in a Problem Set.

F.3   List of Documents

```
Document  1  :  COURSE SYLLABUS + Appendices   ; THIS DOCUMENT
Document  2  :  Brief on some Fundamentals of Computer Science
Document  3  :  Submission guidelines
Document  4  :  Typing math in canvas
Document  P  :  Canvas Exam taking and ProctorU
```

Document 2 is work in progress. Read carefully the sections needed; it might contain errors. Use it at your discretion.

The Course FAQ is on the next page

A. V. GERBESSIOTIS
CS610
Spring 2023   January 05, 2023
Appendix G: **FAQ**
Page 11   **Document 1**

G   Course FAQ

1. WHAT'S THE COMPLETE NAME OF THE COURSE?

   CS610 : Data structures and algorithms known also by the acronym DSA.

2. WHO TAKES THIS COURSE? (AKA PREREQUISITES)

A student who has prior exposure to discrete math and programming, elementary data structures and algorithms. Course-wise, taking CS 506 and CS 505 at bridge course-level, or CS 241 and CS 114 at undergraduate level, or equivalent classes at NJIT or elsewhere can satisfy this. Discrete math material and elementary data structures and algorithms will be referenced very quickly early in the semester. For discrete math, some additional info is provided in the form of a Document 2. Beyond that you are encouraged to consult your favorite discrete math or elementary data structure and algorithm textbook. *One more prerequisite: Memorize the last four digits of your NJIT ID.*

3. MYUCID CREDENTIALS: MYUCID.NJIT.EDU

Resolve login issues and password management now! Make sure your password does not expire any time soon, and preferably not before the end of the semester. Under regular circumstances passwords expire every 12 months. If it expires, renew it within the first week of classes.

4. COURSE WEB ACCESS? PROBLEMS? WHAT DO I DO?

The course Web-page is described in the syllabus, or in page 1 of this document. All posted URL use `http`; let NJIT figure out the redirects. If the prefix `http://www.cs.njit.edu` does not work, replace it with `http://web.njit.edu`, or `http://cs.njit.edu`. Otherwise there is a serious NJIT IST problem if not resolved within half an hour.

5. COURSE EMAIL? The course email address is `alexg+cs610@njit.edu` per page 1. If you don't receive a response promptly, verify that you typed it as indicated above. There is a plus between the words `alexg` and `cs610` and no spaces. DO NOT USE your mailer's reply button but ALWAYS send a NEW email! Moreover, the Subject line of your email must contain three terms: **cs610**, the last four digits of your NJIT ID, and a term related to the reason you are sending the email (eg. HW3 or Exam1). The instructor will respond to your email. The assistant's email address, if any, will be provided in due time at CWP(Course Information) and will be similarly structured.

6. PROTECTED AREA OF THE COURSE WEB-PAGE? PASSWORDS?

Learn how to navigate around the course web-page. In order to access the protected area, section C of the CWP, you must type in a login name and a password common to all. The pair is on appendix A (i.e. page 5). Logging on canvas requires the use of your OWN myUCID credentials (refer to question 3).

7. HOW DO I USE THE AVAILABLE COURSE NOTES?

The primary reference is the designated textbook as specified in the syllabus. Some supplementary slides are provided in the form of Subjects. THE LATTER DO NOT SUBSTITUTE FOR THE TEXTBOOK.

   The black box on the extreme right indicates the end of this document. ∎