**1. Course Description**

This course is about the design and analysis of algorithms. The student learns some basic mathematical tools that allow him to give an estimate of the running time of an algorithm without actually implementing it. We already know that improving the running time or space of an algorithm can be done either by adopting a particular implementation strategy (e.g. greedy), or simply by selecting the most appropriate data structure for that problem (e.g. heap). In this course, we describe three programming strategies that help us solve a problem more efficiently.

Several important algorithms that are interesting both from a practical and theoretical point of view will be presented.

Prerequisite: CSC 313.

**2.** **Student Learning Outcomes**

Upon successful completion of this course, and as a result of the activities and study in this course, the students should be able to accomplish the following:

* Based on the pseudo-code of an algorithm, give an estimate of its running time and space.
* Given two algorithms, tell which one is better (without implementing them) after computing their running times for example, using asymptotic notation.
* Understand each concept inherent to the following programming strategies: greedy, dynamic, and divide-and-conquer.
* Be able to apply these strategies for solving particular problems.
* And more importantly: given a problem, tell which method is best suited for solving it.

**3. Teaching Methodology and Techniques**

This course relies on lectures of material provided by the text, supplemented by additional lecture material provided by the instructor.

**4. Required Textbook**

Required Text book:

 M.T. Goodrich & R. Tamassia, *Algorithm Design: Foundations, Analysis, and Internet Examples*, JohnWiley & Sons, 2001.

Recommended

Cormen, Leiserson, Rivest and Stein, 2001, *Introduction to Algorithms*, 2nd edition, MIT Press.

**5. Resources Available to Students**

* + - Blackboard (bb) Software: If you are not familiar with the Blackboard system, it is recommended to attend a training session at the University Computer Services in order to know how to use the Blackboard system to enrich the academic communication with your instructor and your colleagues
		- Library Resources: NDU Library is open to students to help you in all your research and class work. Qualified personnel are available to help you.

**6. Grading and Evaluation**

Term Work (Assignments & quizzes) 20%

Midterms 40%

Final Exam 35%

Attendance & Appreciation 5%

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Total 100%

**7. Course Schedule**

(May be slightly modified depending upon background of students)

Lectures will consist of material provided by the text, supplemented by the additional lecture material, as follows:

* + - Algorithm Analysis
		- Fundamental Data Structures
		- Search trees and Skip Lists
		- Sorting, sets, and selection
		- Algorithmic Design Patterns
		- Graphs
		- Weighted graphs
		- Maximum Flow and Matching
		- Text processing

**8. Course Policies**

There are no make-ups for missed tests or for the final examination. Failure to sit for a scheduled test and/or final exam will result in an F on the test/exam. A student may be excused in exceptional cases and upon the discretion of the Computer Science Department, and only if the student presents a valid documented excuse (from the SAO in case of illness) to the chairperson of the department within 72 hours of the scheduled exam date.

While understanding that we all are busy with school, work, and family, your decision to register for this course is an indication that you have made it a high priority. Thus, extensions of assignment due dates are given only in extreme situations (death of a close family member, hospitalization, etc.) and require documentation on your part. Otherwise, due dates are fixed and non-negotiable. All assignments should be submitted on or before the assigned due date. Assignments past the due date will not be accepted for full credit. Examples of unreasonable extensions for an assignment include frequent computer malfunctions, outside class-work, or job responsibilities that inhibit meeting the required deadlines. If you anticipate missing a deadline on an assignment, you should send an e-mail to your instructor before the deadline. Unexcused assignments submitted after the due date may be returned ungraded or assigned a lower evaluation. Whether an extension is allowed will be at the instructor's discretion.

Assignments: All work must be typewritten (unless otherwise specified) and submitted in a professional manner. The instructor reserves the right to return, for resubmission, any work that is not neat, legibly, and professionally submitted

Mobile phones should be turned off and out of sight (i.e. not face-up on the desk but preferably inside purses, backpacks, briefcases, etc. or face down on the desk). Phones may not be answered.

Laptops, Ipads, and all other electronic devices are to be turned off during lectures.

Students must attend class with the required material (i.e. original textbook, notebook, pens, etc.).

Once in class, students are expected to remain in class for the entire period.

English must be the only language spoken in class at all times.

Special needs: Any student who feels s/he may need an accommodation due to a disability should contact the instructor privately to discuss those specific needs.

Students must check their NDU email daily as this is the means used by the instructor to communicate. Students will receive notice via NDU email when the instructor posts announcements on the course's Blackboard.

**9. Policies & Procedures**

**NDU's Attendance Policy**

Student should attend all classes and laboratory sessions on time. A pattern of absences, whether authorized or not, and even below the maximum number (specified below), may alter one's grade substantially. The SAO alone authorizes absences. No absence absolves a student from the responsibility of acting upon the material presented during his/her absence. The maximum number absences for classes that meet on MWF is six; the maximum number for classes that meet on TTh and in the summer is four, (or two hours per credit course). Any student whose absences exceed the maximum limits shall automatically fail the course unless the student withdraws.

**Office Hours**: All instructors at NDU are available for office hours during the week. Please note the office hour that your instructor has dedicated to this course to make an appointment. Just dropping by may not ensure that the professor has set aside time to assist you. Office hours may be used ideally to ask for guidance on an assignment or to ask questions concerning a subject that you were not clear on during class time.

**NDU's Academic Integrity Policy**

Students are expected and encouraged to be honest and to maintain the highest standards of academic integrity in their academic work and assignments at the University. They shall refrain from any academic dishonesty or misconduct including; but not limited to:

* + Plagiarism; that is, the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Also, paraphrasing, summarizing, as well as well as direct quotations are considered as plagiarism, if the original source is not properly cited.
	+ Cheating.
	+ Assisting in cheating.
	+ Substituting a student in the taking of an examination.
	+ Substituting examination booklets.
	+ Submitting the same work for more than one course and the like. Submitting papers written by others.
	+ Receiving or providing unauthorized help or assistance in any academic work or assignment. Intentional violation of program and degree requirements and regulation as established by the University.
	+ Dishonest reporting of computational, statistical, experimental, research, results, or the like.

## System of Grades

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| --- | --- | --- | --- |
| **Grade** | **Description** | **Quality Point Value** | **Percentage Equivalent** |
| *A+* | Outstanding | 4.0 | 97-100 |
| *A* | Excellent | 4.0 | 93 - 96 |
| *A-* | Very Good | 3.7 | 89 - 92 |
| *B+* | Good | 3.3 | 85 - 88 |
| *B* | Good | 3.0 | 80 - 84 |
| *B-* | Good | 2.7 | 77 - 79 |
| *C+* | Satisfactory | 2.3 | 73 - 76 |
| *C* | Satisfactory | 2.0 | 70 - 72 |
| *C*- | Passing | 1.7 | 66 - 69 |
| *D+* | Passing | 1.3 | 63 - 65 |
| *D* | Lowest Passing | 1.0 | 60 - 62 |
| *F* | Failure | 0.0 | 0 - 59 |
| *UW* | Unofficial Withdrawal |  0.0The grade “*UW”* is assigned by the instructor when a registered student has never attended a class or has ceased attending and has not submitted an official course withdrawal request to the Office of the Registrar. This grade is computed as an *F* grade in the grade-point average. |

The University uses the following system of grades. This system consists of letter grades with their corresponding numerical ranges (*i.e.* percentage equivalent, and the 4.0 point maximum).

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## 10. Changes to this course outline

## This outline describes the general characteristics of the course. Although changes are not expected at this time, changes to this outline may occur during the term. Any changes to the outline will be announced in class and will be reflected on blackboard.