

Class Syllabus

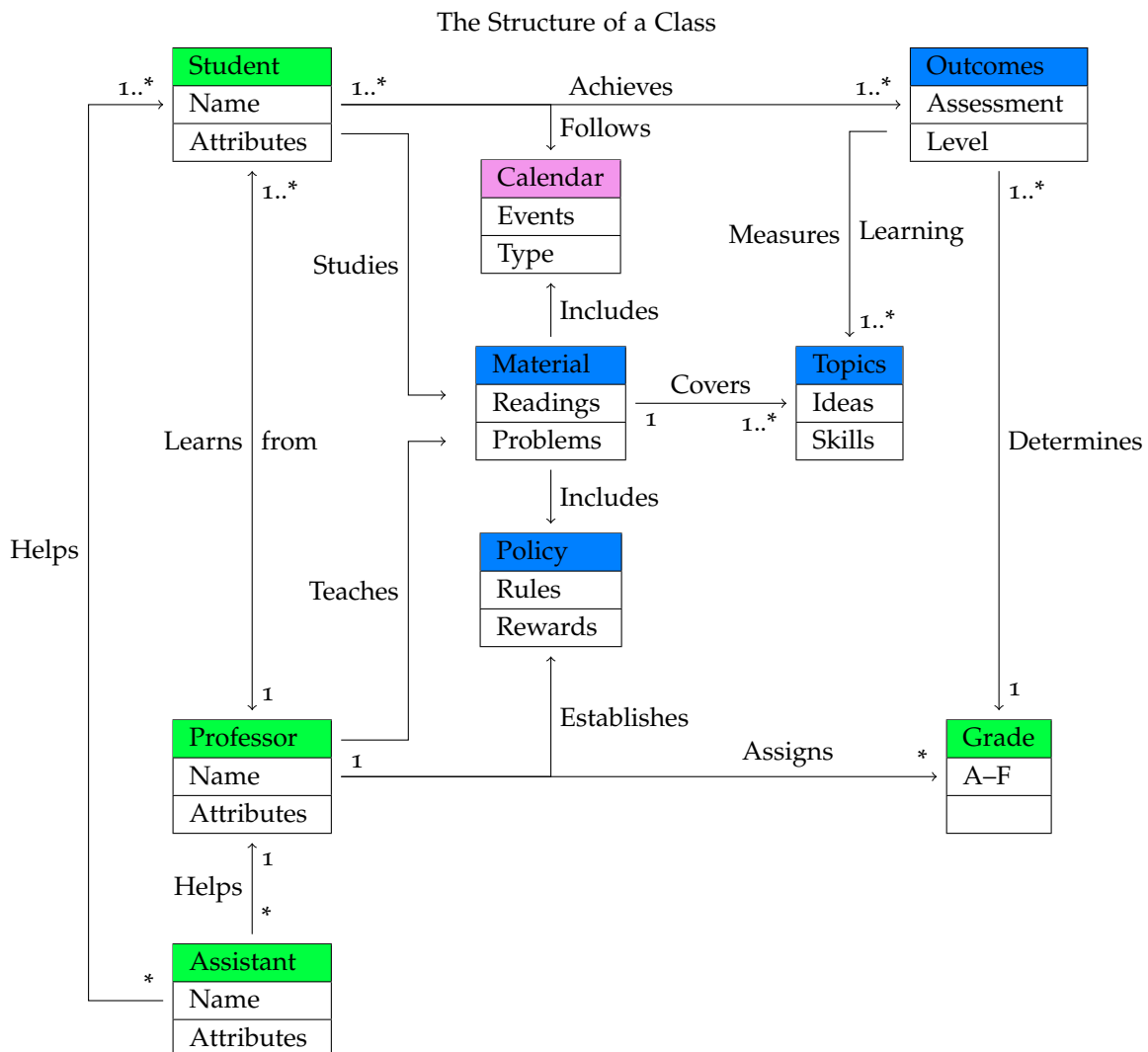
CSE 4081 Analysis of Algorithms

Department of Computer Engineering & Computer Sciences

College of Engineering and Sciences

Florida Tech

Fall 2020 (August 19, 2020)



Course Description

CSE 4081 Analysis of Algorithms (Credit Hours: 3) Covers time and space complexity of algorithms. Analyzes algorithms for sorting, searching, string processing and graph problems. Presents strategies such as divide-and-conquer, and greedy and dynamic programming as problem-solution techniques. Prerequisite: CSE 2010 or ECE 2552 & ECE 3541

Prerequisites by Topic

Algorithmic paradigms, efficiency measures, rates of growth and asymptotic behavior, graph theory, recursion, data structures, and discrete mathematics.

Students, Professor & Assistants

The Professor



William David Shoaff



Room 209, Harris Center for Science and Engineering



wds@cs.fit.edu



(321) 674-8066



Office Hours: WDS Zoom Personal Meeting Room – (765 211 3751)



Teaching Hours:

CSE 3100	Junior Projects:	Monday 11:00 – 11:50 Olin Engineering 137
CSE 4102/4202	Projects 2:	Monday, Wednesday, Friday; 2:00 – 3:50 Crawford 210
CSE 4081	Algorithms:	Monday, Wednesday, Friday; 3:00 – 3:50 FTC Zoom Meeting ID: (993 3880 0648)

Students

Get to know your fellow students. Help each other. You are required to work on a team project where the team is of size 2 or 3.

Assistants

To be determined; none expected

Calendar

Dates for exams, projects, and presentations are predictions and subject to change. Attend class and listen to Canvas announcements for updates.

The projected class calendar is

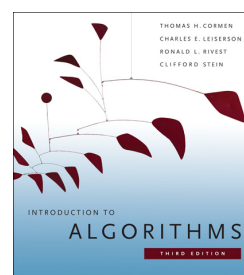
- Individual Project Due Friday, October 15
- Comprehensive Midterm, Friday, October 8
- Last day to withdraw with a final grade of W: Friday, October 23
- Group Project Presentations Start, Monday, November 9
- Nov. 11 Holiday (Veterans Day) (NO CLASSES)
- Nov. 25-2 Holidays (Thanksgiving) (NO CLASSES)
- Study Days, December 3 – 4 (NO CLASSES)
- Comprehensive Final, This final is scheduled for: Friday, December 13, 8 -10 a.m in Evans Library 133.

Florida Tech's Fall calendar can be accessed [here](#).

Material

The textbook for this class is (Cormen et al., 2009). My URL for the class is

<http://cs.fit.edu/~wds/classes/iaa>



There you will find the following material

1. [This syllabus](#)
2. [The class handouts](#)

There are many excellent sources that you can use to learn topics about algorithms see

- (Bentley, 1982),
- (Bentley, 1986),
- (Bentley, 1988),
- (Bird, 2010),
- (Graham et al., 1989),
- (Knuth, 1997a)

- (Knuth, 1997b),
- (Knuth, 1998),
- (Okasaki, 1998),
- (Rabhi and Lapalme, 1999)
- (Stinson, 1987).

There is additional material on the [Canvas Learning Management System](#) under Modules. The main use of the LMS is communicating (announcements, posting material in Modules, posting grades, and linking back to [files stored at the class URL](#)).

Policies

Courses Recording

NOTICE TO COURSE PARTICIPANTS:

This course may be recorded for use by students or faculty. Enrolled students are subject to having their images and voices recorded during the classroom presentations, remote access learning, and online course discussions. Course participants should have no expectation of privacy regarding their participation in the class. Recordings may not be reproduced, shared with those not registered in the course, or uploaded to other online environments. All recordings will be deleted at the conclusion of the academic term.

Mandatory Face Covering

In accordance with “Florida Tech Safe: Return to Learn” procedures, instructors will enforce Florida Tech’s mandatory face covering policy in all classrooms and teaching labs. All students **MUST** wear appropriate face coverings that cover their mouth and nose during all face-to-face course meetings. Students who fail to comply with this policy **WILL BE REQUIRED** to leave the classroom immediately. Students unable to comply may contact the Dean of Students Rodney Bowers for further options.

Title IX

The Patsy Mink Equal Opportunity in Education Act, aka Title IX:

What is Title IX?

Title IX of the Educational Amendments Act of 1972 is the federal law prohibiting discrimination based on sex under any education program and/or activity operated by an institution receiving and/or benefiting from federal financial assistance.

Behaviors that can be considered “sexual discrimination” include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. You are encouraged to report these behaviors.

Reporting

Florida Tech can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one complainant reports having been assaulted or harassed by the same individual.

Florida Tech is committed to providing a safe and positive learning experience. To report a violation of sexual misconduct or gender discrimination, please contact Security at 321-674-8111. *** Please note that as your professor, I am required to report any incidences to Security or to the Title IX Coordinator (321-674-8700).** For confidential reporting, please contact CAPS at 321-674-8050.

Suggested Syllabus Language
J. Oglesby: 02/06/2015

Fanak Baarmand has the position of Title IX Coordinator for the university. All incidents or complaints concerning Title IX policy violations should be referred to her.

Office: Room 135, Quad 401, Miller Building Extension: 8885
Email: fbaarman@fit.edu

Plagiarism

Students are encouraged to help each other on assignments, but plagiarism and use of external Question & Answer sites are prohibited.

- First violation: zero on assignment/test

- Second violation: 'F' for the course

Attendance

The class meets on Monday, Wednesday and Friday at 3:00 P.M. to 13:50. The location is Evans Library 133. Attendance is required.

If, for some reason ¹, you cannot attend class [inform your professor](#) as soon as possible. Written documentation is necessary for an absence to be excused.

¹ Religious holiday, illness or accident, family emergency, ...

Rules for quizzes and exams

1. No notes, books, conversations, peeking at a neighbor's answers, note-passing, sign language, mechanical/electrical devices: abacus, camera, telephone, calculator, etc.
2. First violators of rule 1 will receive a 0 for the test. Second violators of rule 1 will receive an F for the course.

Rules for homework

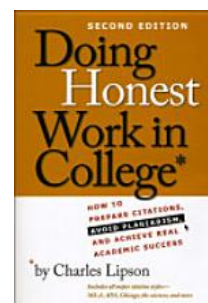
1. Explicit homework will not be assigned nor explicitly graded.
2. Bring your answers and questions to the professor, or the teaching assistant(s),
3. You are encouraged to work algorithm problems with others.
4. Ask for guidance when you do not understand problem or a solution to it.
5. Do not turn in homework when you do not understand the answers. Ask for guidance instead.

Academic integrity The department enforces an [honor code](#). This honor code establishes a recommended penalty and reporting structure for academic dishonesty.

Offense	Recommended Penalty	Report to
First	Zero on work	Dean of Students
Second	F in course	Dean of Students
Third	Expulsion from Program	UDC

Florida Tech provides [guidelines](#) to help students understand plagiarism, its consequences, and how to recognize and avoid academic dishonesty. Lipson describes three principles for academic integrity ([Lipson, 2004](#)).

1. "When you said you did it, you actually did."
2. "When you use someone else's work you cite it, When you use their word, you quote it openly and accurately."
3. "When you present research materials, you present them fairly and truthfully. That's true whether the research involves data, documents, or the writing of other scholars."

*Issues and Concerns*

1. Inform your teacher if accommodations need to be provided for exams.

Don't fail in silence!

Richard Ford's advice to new students, The Florida Tech Crimson, Fall 2011, Issue 2

2. If you have an academic problem, your teacher can link you to support services.
3. If you have a personal issue, without revealing private information, your teacher can link you to support services.
4. No forms of discrimination or harassment will be tolerated.

Where to Get Help

1. Your professor for this class MWF 9:00–10:45 and 1:00–1:30, or by appointment, walk-ins welcome.
2. Your professors for other classes
3. Your academic advisor
4. Your teaching assistants
5. Staff at the [Computer Sciences Help Desk](#)
6. The Academic Support Center
7. Counseling and Psychological Services

Topics

1. Growth of functions: Asymptotic notation: Big-o, Omega, and Theta
2. Divide-and-conquer algorithms
3. Probabilistic Analysis and Randomized algorithms
4. Sorting Algorithms: Best, Worst, and Average case analysis
5. Hash tables
6. Dynamic programming
7. Greedy algorithms
8. Amortized analysis
9. Graph algorithms
10. String algorithms
11. Approximation algorithms
12. Complexity theory: Deterministic and Non-Deterministic Polynomial time algorithms; NP-Complete and NP-Hard Problems

The emphasis is on algorithmic problem-solving. Algorithmic efficiency, elegance, and generality are quality characteristics.

Student Learning Outcomes

By the end of the course, each student will be able to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline. engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
7. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
8. Acquire and apply new knowledge as needed, using appropriate learning strategies.
9. Function as productive members of a team.
10. Describe their problem and solution to a range of audiences.
11. Recognize the limitations of their education and the need for continual learning.

Grades

Your final grade will be based on your performance on quizzes and projects. Projects will be submitted electronically using the [Canvas Learning Management System](#).



Grades and their relation to performance					
Grade	A	B	C	D	F
Performance	Excellent	Good	Average	Poor	Failure

Student performance is measured in the following ways.

1. Individual Project (25% of grade)
2. Team project (25% of grade)
3. Midterm Exam (25% of grade)
4. Final examination (25% of grade)

Your score S will be a number between 0 and 100 computed by the formula

$$S = \frac{25}{100} \sum (\text{individual projects} + \text{team project} + \text{midterm} + \text{final})$$

Extra credit will not be given.

Final letter grades will be assigned based on the range in which your score S falls:

$$(90 \leq S \leq 100) \Rightarrow A, \quad (80 \leq S \leq 89) \Rightarrow B, \quad (70 \leq S \leq 69) \Rightarrow C, \quad (60 \leq S \leq 59) \Rightarrow D, \quad (0 \leq S \leq 59) \Rightarrow F$$

The last day to withdraw for the class with a final grade of W is Friday, October 23.

Individual project

Full description posted on canvas ([Canvas Learning Management System](#))

- Instructor selected
- Programming language: Individual Student selected
- Deliverables: Same as team project deliverables,
- Complete before Spring break.

Team project

Full description posted on canvas ([Canvas Learning Management System](#))

- Self-organizing team of 2 to 3 students (submit team roster to instructor before end of week 2.
- Team selected project (submit topic to instructor before end of week 3.
- Deliverables:
 - Problem statement,
 - (Pseudo-code) for at least one algorithm that solves the problem,
 - Code compiled and executed (team choice for programming language),
 - Build and execution instructions,
 - Mathematical analysis of algorithm's time/space complexity,
 - Profile report of algorithm's execution,
 - Slides for in-class presentation
 - Summary of team-members' contributions,
 - A written report.
 - Complete before penultimate week of the course.

Checking Grades

Check you grades on the [Canvas Learning Management System](#) . [Contact your professor](#) when you find an error in your recorded grades. Be able to document the error.

Measure of Success

The target achievement levels for the class are:

- 70% of students will score at or above average (70%) on the final comprehensive examination. The questions on the final measure attainment of course outcomes.
- 80% of students will rate their teammates as good to excellent as measured by a rubric completed by teammates.
- 80% of students will be rated as good to excellent communicators as measured by a rubric completed classmates and the instructor.

References

- Bentley, J. L. (1982). Writing Efficient Programs. Prentice-Hall.
- Bentley, J. L. (1986). Programming Pearls. Addison-Wesley.
- Bentley, J. L. (1988). More Programming Pearls: Confessions of a Coder. Addison-Wesley.
- Bird, R. (2010). Pearls of Functional Algorithm Design. Cambridge University Press, New York, NY, USA, 1st edition.
- Cormen, T. H., Leiserson, C. E., Rivest, R. L., and Stein, C. (2009). Introduction to Algorithms, Third Edition. The MIT Press, 3rd edition.
- Graham, R. L., Knuth, D. E., and Patashnik, O. (1989). Concrete Mathematics. Addison-Wesley.
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- Lipson, C. (2004). Doing Honest Work in College: How to Prepare Citations, Avoid Plagiarism, and Achieve Real Academic Success. University of Chicago Press, Chicago.
- Okasaki, C. (1998). Purely Functional Data Structures. Cambridge University Press, New York, NY, USA.
- Rabhi, F. A. and Lapalme, G. (1999). Algorithms: A Functional Programming Approach. Addison-Wesley.
- Stinson, D. R. (1987). An Introduction to the Design and Analysis of Algorithms. The Charles Babbage Research Center, P. O. Box 272, St. Norbert Postal Station, Winnipeg, Manitoba R3V 1L6, Canada, second edition.