

# COP 3504 – Advanced Programming Fundamentals

(Spring 2013)

## Catalog Description

### COP 3504: Advanced Programming Fundamentals

Credits: 3; Prerequisites: MAC 2311 or MAC 3472, programming experience

A fast paced introduction to computer science for students with prior programming experience. Major concepts of computer science and the process of computer programming, including object-oriented programming, procedural and data abstraction and program modularity.

## Accreditation

This course is used to assess program outcomes for these ABET criteria:

- c) an ability to design hardware and software systems, components, or processes to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- e) an ability to identify, formulate, and solve hardware and software computer engineering problems, accounting for the interaction between hardware and software.
- k) an ability to use the techniques, skills, and modern engineering tools necessary for computer engineering practice.

## Course Overview

While this course will heavily utilize the Java programming language, and even teach certain aspects of it when necessary, this *is not* a Java course. Instead, this course is designed to teach fundamental concepts of computer science and software engineering. The Java programming language will be used toward this end, as (a) establishing a common language eases communication and aid among students and the instructor, (b) utilizing the Java language will provide necessary programming experience for later courses, as it is used or is similar to other programming languages used in later courses, and (c) it produces working programs which can be used to exemplify and practice using the topics covered in class.

Note that this course is directed toward students with prior programming experience who are majoring in computer science or computer engineering. This class should only be taken by those who have obtained a 'B' or greater in a prior

programming class, or by those who have taken the AP Programming test and received a 4 or higher – feel free to email the instructor to ask if you have sufficient experience otherwise. Given the advanced nature of this course, those with little prior experience will likely not do well – regardless of how fast you are capable of learning, programming has a corresponding mindset that takes time and experience to truly learn, and this class is not designed to provide enough of either to under-prepared students before it delves into more involved concepts and assignments. Even those who meet these criteria often must put forth extra effort – there is little replacement for long-term experience, and if standard programming is “algebra,” this course’s material has often been compared to “calculus.” I would personally say that at least a year’s experience with programming is needed.

Those who have little to no programming experience, but still wish to learn the fundamentals of computer science and software engineering should probably sign up for the COP 3502 – 3503 course sequence instead. This sequence is designed to teach Java along the way at a pace appropriate for new programmers, while covering the same concepts. Note that once COP 3502 (or CIS 3022) has been taken, this course *cannot* be taken – the course sequence must be finished by taking COP 3503. For those who merely wish to learn programming, without any focus toward the higher-level concepts of computer science and software engineering, a better course might be CGS 2414: Programming with Java, which is geared toward non-majors.

## **Course Objectives**

By the end of the semester, successful students should be able to:

- understand and utilize the underlying paradigm of object-oriented programming,
- make full and constant use of procedural and data abstraction,
- write modular programs,
- and analyze and perform testing on programs, both prewritten and self-made

## Course Instructor and Teaching Assistant

Instructor: Joshua Horton  
Location/Time for office hours: E504 / T 1:30 – 3:30 PM  
E-mail: [jhorton@cise.ufl.edu](mailto:jhorton@cise.ufl.edu)  
Class website: On Sakai (<http://lss.at.ufl.edu>)

Teaching Assistant: Aysegul Ozkan  
Location/Time for office hours: E313 / W 3:00 – 5:00 PM  
E-mail: [aozkan@cise.ufl.edu](mailto:aozkan@cise.ufl.edu)

Teaching Assistant: Leila K.  
Location/Time for office hours: E310 / W 8:30 – 10:30 AM  
E-mail: [leila@cise.ufl.edu](mailto:leila@cise.ufl.edu)

## Course Meeting Times & Locations

Lecture: MWF 7<sup>th</sup> period, CSE E119  
(1:55 – 2:45 PM)

Discussions: W, CSE E116 (*Inside* E114, the big computer lab)  
Sections: 8<sup>th</sup> – 9<sup>th</sup> periods in E116.

F, CSE E113 / CSE E116 (Both are *inside* E114, the big computer lab)  
Sections: 4<sup>th</sup> – 5<sup>th</sup>, 8<sup>th</sup> – 9<sup>th</sup> periods in E116,  
4<sup>th</sup> – 5<sup>th</sup> periods in E113.

## Textbooks

Optional: *Java in a Nutshell (5th Edition)*, David Flanagan, O'Reilly Press, 2005.

For those who would prefer a hardcopy reference for the Java language, this book should serve quite nicely. Note that there is plenty of free online documentation for Java – in particular, the Javadocs – and so I personally prefer to use such online resources.

Recommended: *The Object-Oriented Thought Process*, 3rd Edition, Matt Weisfeld, Addison-Wesley, 2009.

Has an excellent discussion of the O-O thought process.

Highly recommended: *An Introduction to Programming and Object Oriented Design Using Java*, Jaime Nino and Frederick A. Hosch, John Wiley, New York.

It is a good primer on the process of programming, and is the most similar of the three to the path this course will take.



## Grading

Your final grade in the class will be computed by calculating your point total per division of the coursework as given in the below table. Each division will then be reweighted by its percentage value in the table, and then summed.

|                            |     |
|----------------------------|-----|
| Assignments                | 50% |
| - Homeworks: 20%           |     |
| - Lab Exercises: 15%       |     |
| - Project: 15%             |     |
| Midterm Exams (in class)   | 25% |
| Final Exam (comprehensive) | 25% |

### *Homeworks:*

Homeworks will be assigned throughout the semester at a rate of at least one every three weeks, and *no homework will have a deadline closer than three regular class periods after the date of its assignment*. Unless otherwise specified, all homeworks are to be done individually. Any electronic components of assigned homeworks and projects will be turned in on the Sakai site.

Be aware that homeworks involving coding will look for the following criteria:

- Good commenting
- Coherent, well-written code
- Proper use of any conventions given in class (such as getter/setter methods)
- Adherence to homework guidelines

Any lack thereof may constitute grounds for loss of points, especially if it causes the instructor or the TA to require significantly greater effort to understand your work as a result of being missing.

### *Lab Exercises:*

During discussion sections, there will often be pre-planned exercises worth part of your grade. These quizzes will be somewhat more oriented toward aspects of programming, testing, and design by nature, though they will not always involve actual coding on your part. While attendance is not going to be tracked directly in this class, note that participation in the activities of your discussion section will thus count as part of your grade.

### *Project:*

There will be one class project toward the end of the semester for which I will divide each discussion section into teams of four to five people. (The timing of this assignment will likely be around the second half of the semester.) Aside from the

larger group size, this assignment will function much like a homework, though it will count for its own section on the class point-division table above.

### *Midterm Exams:*

There will (likely) be two midterm exams for this course – one will be held the week before spring break, while the other will be at the end of the semester. Each will have equal weight and may have an extra credit question. Be aware that any such questions will be substantially more involved than the other questions on the test and while they will not require knowledge of material beyond the domain of the class, they will require *significant* thought beyond that which has been formally presented in class.

Due to the nature of my extra-credit questions, I may give an option on any given test to focus solely on the extra-credit problem for simultaneous full test and bonus question credit. (I have a tendency to call these “megaproblems.”) I may also require one or two other, much smaller problems for completion for such a path. While I will choose the option which maximizes your final grade, do note that you are responsible for however you approach the test – the “choose-your-own-adventure” nature of this test is provided to allow students more flexibility in testing structure. For those who simply want a standard test, the standard path is there – but for the more adventurous, this provides extra time in which to take on the challenge imposed by these bonus questions. Taking the extra-credit path *will* be more challenging...but the rewards for taking on and making good progress on said challenge will be proportionate. (Grades over 100% have been awarded in the past for answers to a megaproblem that were still either incomplete or partially incorrect.)

### *Final Exam:*

There will be a comprehensive final exam held during the final exam period of the semester. It will be of similar form to the midterms, but will *not* have extra credit questions available. The final exam will be *optional* for students who have a cumulative grade of an A leading into it and who meet any additional criteria that may be outlined toward the end of the semester.

### *On Group Assignments:*

While the majority of the homeworks and lab exercises will be done individually, at times we will use cooperative learning in a small group setting for particular assignments. This means that a group of two or three students will all work together to produce a single submission. The group grade will be determined from the submission's quality *and* from a small interview with a randomly selected member from the group. Studies show that this technique benefits the group as a whole.

In the case of substantial conflict within a group or a non-communicating group member, please inform your TA and the instructor. Adjustments may be made accordingly for extenuating circumstances.

### *Grading / Testing Philosophy*

In regard to assignments and tests, note that I am a strong believer in the notion of “partial credit” – I consider the thought process reflected by students’ work to be of greater importance than merely obtaining the correct result. This is *especially true* of any “bonus point” / “megaproblem” opportunities. Your best chance of obtaining good partial credit is to show your work, any assumptions you made, and your thoughts on any point of confusion if you find yourself unable to finish a problem. Note that I can only grade on what I see, so even if you have the core idea of a problem solved, I still need to see how it applies to all aspects of the problem to give the best possible credit.

### **Grading Scale**

The grading system will, at its harshest, be as follows:

| Letter Grade | Minimum % required |
|--------------|--------------------|
| A            | 92.0               |
| A-           | 88.0               |
| B+           | 85.0               |
| B            | 80.0               |
| B-           | 78.0               |
| C+           | 75.0               |
| C            | 70.0               |
| C-           | 68.0               |
| D+           | 65.0               |
| D            | 60.0               |
| D-           | 58.0               |

It is possible that grades will be curved at the end of the semester, but do not count on this – it is **solely** dependent upon the instructor’s discretion. *Any curve that may be applied will never cause your grade to be lower than that which would be assigned by the above table.*

- A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

## Course Policies

- Electronic devices:
  - *Cell phones:* All cell phones should either be turned off or set to vibrate / silent at all times. No phone calls or text messages may be sent within the classroom – if it is important to take a call or text, please leave the classroom to do so, and be prepared to make up the missed material outside of class.
  - *Smartphones/Tablets/Laptops:* Please limit your activities on such devices to those which aid in your studies. It is your responsibility to maintain proper focus on the material being presented, as *not all course material will be in electronic form*.
  - *Other devices:* Unless otherwise permitted by the instructor, please keep other devices turned off during classroom activities.
- Missed Lectures: It is the student's responsibility to be as current as possible with the course material at any given time. Students should contact others in the course to obtain necessary notes and should visit the instructor and/or the TA(s) during office hours as time permits.
- Makeup Exams: No makeup exams will be given unless there are extenuating circumstances, such as a significant illness, family emergency, or the wedding of a relative. If possible, please notify the instructor at least two weeks BEFORE an exam will be missed. Please submit written or printed documentation of the reason for your absence, regardless of whether the instructor has been notified. (Bring a doctor's note, wedding program, or the like.)
- Late Homework/Projects: Any homeworks and projects turned in after the given deadlines will be penalized by 10% of the maximum grade for each class day late, up to 3 class days total, unless there are extenuating circumstances as outlined for makeup exams. In such cases, a new deadline will be established on a case-by-case basis. After three class days, late homework will *not* be accepted for *any* reason without either extenuating circumstances or prior approval from the course instructor. If you know you're going to be severely late with an assignment before the "three class days" deadline has passed, please contact me, be up front about the situation and we can work something out, but after this deadline, there will be **no** exceptions.
- Practice Exams: Note that practice exams do not guarantee that a similar question will be on the real test. This being said, any questions on the practice exam will likely cover similar topics, even if the manner by which the questions address those topics is different. The lone exception to this is any bonus problem; these tend to vary substantially.



- Re-grading: Re-grades may be requested on any project, homework, quiz, or midterm exam up to one week after the grades are made available, or up to the date of the final exam, whichever is earlier. The reason for the re-grade should be formally presented in writing. Be aware that a re-grade *could* result in *loss* of points if a re-examination of the work in question finds that too many points were awarded the first time.

Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Note that while it is permissible for students to share thoughts regarding the general approach to a problem, it is *not* permissible to copy work from one another, or even the high-level design specification. As this class is, in part, about the process of problem solving in the setting of computer programming, it is imperative that each student come up with their own unique final approach, design, and solution. There is always a large variety of potential “wordings”, and thus solutions, to any given problem, so two submissions which overly resemble each other will be taken as a case of academic dishonesty. While I do not forbid helping each other during the debugging process on coding projects, know that each student is expected to be capable of debugging code on their own – this will be tested on occasion. Secondly, “helping” somebody by suggesting use of a different and specific approach does constitute cheating – it removes the need for problem solving on the part of the student being helped and hurts their ability to truly learn.

Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Software Use – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.