CS 427, Object-Oriented Software Development Syllabus

Instructor: David Bahr (answers to Dave, David, Mr. Bahr, Dr. Bahr, yo, hey you, and others). Work Phone: 964-5147. Home phone: 303-449-9179 (before 9:30pm). Cell: 303-249-7468 (spotty reception at my house). dbahr@regis.edu.

Schedule: T Th, 9:25pm-10:40pm.

Office Hours: Carroll Hall room 241, unless I specify a particular pool table in advance. T Th, 12:30pm-1:30pm. Fri by appointment, 10:30am-12:00pm and 1:00pm-3:30pm. But feel free to drop by or call at any time.

Summary: Object-oriented (OO) programming shifts the emphasis from step-by-step procedures (algorithms) to the objects on which the steps were supposed to act. For example, instead of code that has step-by-step skiing instructions, an OO program will create a self-contained block of code that is the skier, another block that is a ski, and another block that is the snow. The blocks (or objects) then interact by sending messages to each other and reacting to those messages. (Skier Object: “Yo Mr. Ski Object, that’s a Tree Object, so turn right.” Ski Object: “Sorry, no can do. Fall down now! My Binding Object is broken!”) We’ll explore inheritance, polymorphism and other concepts that enhance our ability to write self-contained replaceable objects. For example, in the previous example, it might be nice to replace the ski with a more reliable snowboard. In OO programming, this becomes very easy. Unlike traditional procedural code, we’ll learn to write simple objects that are easily modified, updated, extended, or replaced. Our objects will also be flexible, responding to different situations by simply sending different messages – no need to rewrite the entire program to handle new situations.

Learning Objectives:
(1) Take your skills to the advanced level necessary to get a job as a programmer and necessary as a tool in more advanced computer science and programming classes.
(2) Exercise logical-thinking and problem-solving skills necessary for more advanced science classes.
(3) Understand the object-oriented paradigm and its advantages over older paradigms.
(4) Understand encapsulation and why it is important to prevent errors.
(5) In particular, gain proficiency with class casting, dynamic binding, polymorphism, exception handling, inner classes, abstraction, generalization (inheritance), and other OO concepts.
(6) Focus on the flexibility, modularity, and ease of replacing objects as a motivation for improving your designs both in programs and in other settings (business, etc.).

Exams: Mid-term exam, final exam

Homework: Weekly assignments are generally due at the beginning of class each Monday, but check the assignment for confirmation. If Monday is a holiday, then the assignments are due at the beginning of the next scheduled class. Late homework is not accepted and the grade will be a zero. But don’t panic! Your lowest homework grade
will not be considered in the final grade. Note: Most assignments will be turned in by email. If your homework gives me a virus (causing untold hours of pain, anguish, and despair) then your grade will be a zero. No one wants to see me in anguish (right?), so invest in a good anti-virus program and keep it up to date!

**Grade:**
- Class participation (aka attendance): 10%
- Homework: 30%
- Midterm: 20%
- Final Exam: 20%
- Final Project: 20%

Note that class participation counts for a full letter grade.

**Computer Required:** Seems obvious, but you absolutely must have your own computer for this class. No exceptions. See me if this is a problem.

**Online Notes:** I know you are begging for more, so I’ve posted my lecture notes online at http://academic.regis.edu/dbahr/. They are great for review, and even better as a class preview (just imagine how impressed everyone will be with your knowledge of the day’s topic). The online notes do have some occasional typos and outright errors (after all, these are nothing more than my scribbled notes). I’m going to eventually publish these notes as a CD, so I’ll grant extra credit to the first person that points out and corrects an online typo or error. The amount of credit depends on the subtlety and magnitude of the error. I’ll also credit you on the CD, making your name live forever in “print”.

**Topics:**
- Week 1: OO goals, Java review (including public, private, etc.)
- Week 2: Classes and methods, constructors, inner classes, packages.
- Week 3: OO basics (behavior, state, identity, messaging)
- Week 4: Encapsulation of state, class variables, getters, setters
- Week 5: Inheritance, exception handling (with inheritance of Exception class)
- Week 6: Polymorphism (overloading, overriding)
- Week 7: Review and midterm (Thursday, March 4; subject to change)
- Week 8: Spring break
- Week 9: Abstract classes and interfaces, javadoc
- Week 10: OO design (create what classes in what relation for a given problem)
- Week 11: CRC design method, other examples
- Week 12: Graphics
- Week 13: Event handling
- Week 14: Review
- Week 15: Final exam

**Special needs:** If you have a disability requiring academic adjustments for this class, please contact Disability Services (303-458-4941). They will help determine appropriate accommodations. I recommend that you make arrangements as soon as possible because accommodations cannot be provided retroactively.
**Ethics:** It hardly needs to be said, but Regis takes a very dim view of cheating. Students who cheat, plagiarize, copy, fake, bootleg, or attempt to con, defraud, swindle, bamboozle, fleece, dupe, fool, trick, or deceive will fail the course. Other synonyms are also prohibited. For clarity, copying homework is considered cheating. If you have any questions about proper conduct please come talk to me. Consistent with the College's Academic Integrity Policy, I will report all violations to the Dean's office. Students who have committed multiple instances of academic dishonesty can be subject to institutional penalties like probation, suspension, or expulsion, in addition to the penalties for this course. The Academic Integrity policy is described in the Bulletin; detailed information about the policy and the appeals process can be found in the Dean's office.

**Dr. Bahr’s Grading Policy (in gory detail)**

My goal is to produce graduates that I would hire if I was running my own business. I also want to produce graduate students that I would accept into a PhD program. This means, of course, that I can’t pass out A’s like free candy. However, it does mean that I am invested in your progress, and I very much want all of my students to do well.

In the past, I have worked as a manager at various “.coms”. I have also worked with graduate students on complex research at the cutting edge of science. I know what is necessary to succeed in the workplace and in graduate school. Therefore, my grading is not designed to penalize but instead to prepare you with important and necessary skills. Ideally, this preparation will pay off with the best possible job after graduation and place you into the best possible graduate school.

To that end, the following might help you to understand my homework assignments and grading.

1. My assignments typically have some problems that will reinforce what you have learned in the classroom and in any assigned reading. Each assignment will also have one or more problems designed to “push your envelope” and to see if you can stretch your newfound knowledge into a situation that was not covered explicitly in the classroom.

2. In some classes, the assignments are “cumulative” with a build-up to the final project. Initial assignments develop skills that are used later in the semester.

3. Students that do the assigned reading almost always get a better grade. The required reading, if any, is at the top of each assignment.

4. I always drop your lowest homework score for the semester. In other words, you get one “freebie”. Why? Because everyone has a bad hair day. You might get the flu, you might have a family emergency, or you might just have trouble with the assignment. I remove that lowest score, no questions asked. But please,
consider saving that freebie for a rainy day. Don’t blow off an assignment early in the semester, or you might not have the freebie later in the semester when you really need it. That’s a rookie mistake.

(5) I don’t accept late homework. All assignments are due at the beginning of the class hour. That includes any written, emailed, and/or oral portions of the assignment. It is not acceptable to print or email your work an hour after class. This policy is uniform and fair to all concerned.

By the way, I am MOST interested in having you learn the material, so if your assignment is late, you may still turn it in. I will grade the late work, but I won’t give you credit. Remember, if your job assignment is late, then they just fire you. In that light, my policy seems downright lenient. 😊

(6) I do not grade on a curve. In some semesters, I have had every student in my class get an A for the semester. Awesome! However, I am not afraid to pass out low grades, and I occasionally have to fail a student. I hate doing that, and if you are struggling please seek my assistance early. I have never had to fail anybody that sought help on a regular basis.

(7) I do not tolerate cheating or copying. It’s an automatic fail for the class. You may always work together on assignments, but I recommend sitting face to face so that you cannot actually copy your partner’s work. (By the way, it is a common misconception that your code will be identical to everybody else’s. Everyone has different code, even for the simplest assignments.)

(8) 10% of your final grade at the end of the semester is for “participation”. This is not an attendance score. Instead, I’m looking for interaction, interest, questions, and positive contributions inside the classroom. If you are contributing and asking questions regularly, I almost always give the full 10%.

(9) Please note that I do not give credit for “effort” on individual assignments – some folks just have to put in more time than others. That’s neither a positive nor negative assessment of your skills, so homeworks are graded strictly on merit. But any extra effort will certainly count towards the 10% participation grade!

(10) I am neither the easiest nor the toughest grader on campus, but I am reasonable and open to questions. If you are ever puzzled by your grade, you should feel free to ask. On some occasions, I will give back points if you can explain your motivation.

(11) I can be very particular about the details. This is not because I hate you, I promise. Instead, I’m trying to encourage good habits that will make you a star on the job. So I will frequently take off a small number of points for poor spelling, poor grammar, poor formatting, poor commenting, poor exception handling, etc. With atrocious grammar, would you expect to keep a job as a
journalist? No. Similarly, you can’t expect to keep a job as a programmer with atrocious formatting, commenting, etc. So, after four years of careful critique, most of my students do an excellent job at “getting the details right”.

(12) Finally, I return assignments promptly. If you have not received your graded assignment after one week, that would be very odd. So come to see me and make sure that (1) my dog didn’t eat your assignment, and (2) the world hasn’t ended.

For your effort on the assignments, I promise that you will have a better understanding of the material, and that this will translate to confidence on the job. Talk to some of my graduates, and they will tell you that the homework really pays off! My students have been very successful in the workplace, and some employers call me each year to ask specifically for my graduating seniors.