

**CS2100 DATA STRUCTURES & ALGORITHMS****I. COURSE DESCRIPTION**

A second course in computing with an emphasis on foundational data structures and program analysis. The course provides a comprehensive look at the Java programming language including object-oriented programming, concurrency, inheritance / polymorphism. Additionally, foundational data structures and related algorithms / analysis are studied. These include Lists, Stacks, Queues, Trees, Hash Tables, and Priority Queues.

**II. GRADING SCALE AND BREAKDOWN**

Grades will be awarded according to the **UVA grading scale**:

|                 |                   |                |                |
|-----------------|-------------------|----------------|----------------|
| <b>A</b> 10-9   | <b>B+</b> 7,9-7   | <b>C</b> 5,4-5 | <b>F</b> 4,9-0 |
| <b>A-</b> 8,9-8 | <b>B</b> 6,9-6    |                |                |
|                 | <b>B-</b> 5,9-5,5 |                |                |

|               |     |
|---------------|-----|
| Homework      | 30% |
| Midterm exam  | 30% |
| Final exam    | 30% |
| Daily work    | 5%  |
| Participation | 5%  |

**Homework (30%)**

Students will have the opportunity to evaluate their learning progress with quizzes and programming exercises. They will take place during class without notice or to do at home. Quizzes will be typically between 5 and 10 questions: multiple-choice questions, definitions, concept questions, some simple numerical calculation or problems, etc. Programming exercises will request to develop a specific program.

### Midterm exam (30%)

This exam will cover the material you worked on from the beginning of the course until the week before the exam. Only topics covered during the course will be asked. The format of the exam is mainly multi-choice test. It will be composed of one or several of each of the following types of exercises: multiple choice questions, definitions, concept questions, numerical calculations, problems. More information will be given during the last week of class before the Midterm Exam.

### Final exam (30%)

This exam will cover the last part of the course which were not included in the Midterm exam. Only topics covered during the course will be asked. The format of the exam will be part multi-choice and part elaboration of the question. More information will be given during the last week of class before the Final Exam.

### Daily work (5%)

Students will be asked to accomplish some daily tasks along the course: prepare readings or some pre-work prior to class, do homework, solve problems in class individually or in a team, prepare and expose presentations, etc.

Some of those tasks will be graded, and some will not be. Students will not be informed in advance, which will count as graded Daily Work.

### Participation (5%)

Students are expected to comply with the assigned work plan on a daily basis. Coming prepared for class is essential to the learning process. The following rubric is important regarding participation grades:

A The student always prepares the class and complies with the work plan assigned daily; he/she participates voluntarily and frequently, works well as a team, and contributes positively to the classroom environment.

B The student participates voluntarily and frequently by answering questions from the teacher

C The student participates sporadically when the teacher asks and he/she/they occasionally ask questions.

D The student does not make an effort to participate or minimum work is done.

F The student is absent and shows disrespect to other peers and to the professor.

## III. BIBLIOGRAPHY AND MATERIALS

**Materials** and slides will be posted on the academic platform. Sometimes we may also use external articles when appropriate. All material needed along the course will be at your disposition on academic platform, so you do not need to buy any book.

The following **bibliography** may also be useful, but purchase is not mandatory:

[Java Programming](#) (a wikibook)

[Data Structures with Java](#) from John R. Hubbard and Anita Huray

## IV. COURSE PLANNING AND CALENDAR

| DATES | CONTENTS                                           |
|-------|----------------------------------------------------|
| 07/09 | Course Introduction and Introduction to Java       |
| 09/09 | Object oriented and control structures and methods |
| 14/09 | Object references and Github                       |
| 16/09 | Classes and objects                                |
| 21/09 | Arrays                                             |
| 23/09 | Inheritance                                        |

|              |                                                |
|--------------|------------------------------------------------|
| <b>28/09</b> | Polymorphism, Abstract Classes and Interfaces  |
| <b>30/09</b> | Generics & Recursion                           |
| <b>05/10</b> | Laboratory I                                   |
| <b>07/10</b> | Abstract Data Types & Comparable & Collections |
| <b>12/10</b> | <b>Fall Break</b>                              |
| <b>14/10</b> | <b>Fall Break</b>                              |
| <b>19/10</b> | LinkedLists                                    |
| <b>21/10</b> | Laboratory II                                  |
| <b>26/10</b> | <b>Mid Term exam</b>                           |
| <b>28/10</b> | Debugging and exceptions                       |
| <b>02/11</b> | Unit Testing                                   |
| <b>04/11</b> | Algorithms & Big-Oh                            |
| <b>09/11</b> | Trees                                          |
| <b>11/11</b> | Trees Traversal                                |
| <b>16/11</b> | Binary Search Trees                            |
| <b>18/11</b> | AVL                                            |
| <b>20/11</b> | Red Black Trees                                |
| <b>23/11</b> | HashTables                                     |
| <b>25/11</b> | Sets, Maps, Queues & Stacks                    |
| <b>30/12</b> | Search and sort                                |
| <b>02/12</b> | Binary Heap & HeapSort                         |
| <b>09/12</b> | MergeSort & QuickSort                          |
| <b>14/12</b> | Priority Q                                     |
| <b>16/12</b> | <b>Final Exam</b>                              |

|                              |
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| <b>IMPORTANT INFORMATION</b> |
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### 1) Use of Spanish at the Center

The use of Spanish at the Center is strongly encouraged. Remember that you have come to Spain to learn Spanish and immerse yourself in its culture, and there is no better way to do so than by using Spanish on as many occasions as possible.

### 2) Class Attendance and Tardiness

2.1) Attendance and punctuality are essential for the successful completion of the course. Consequently, unexcused absences and lateness will negatively affect the final grade.

2.2) Only one unexcused absence is permitted. Please bear this in mind when planning trips or outings.

2.3) Arriving more than 5 minutes late to class will count as half an absence (1/2). It is the student's responsibility to notify the instructor of an absence before the class begins.

2.4) Arriving more than 30 minutes late to class will be considered an absence.

2.5) Four (4) unexcused absences will result in the student not receiving credit for the course.

2.6) Only documented absences will be considered excused: a religious holiday, a family emergency, or a medical appointment. Medical absences must be supported by a doctor's note and submitted at reception on the day the student returns to class after the incident has ended.

### 3) Academic Integrity

3.1) The exchange of information is not only permitted but is also a way of enriching the knowledge acquired during the course. However, all work submitted for each course must be individual and original in every respect. Any sources and direct quotations used must be properly cited.

3.2) Remember that the use of artificial intelligence to complete assignments or examinations is strictly prohibited unless an instructor expressly states otherwise. Such use constitutes a lack of authenticity, and may amount to direct plagiarism, in addition to undermining the development of critical thinking and writing skills, which are among the primary goals of this program. Failure to comply with this rule will result in a grade of "F" for the course.

3.3) Any work that has received credit for one course will NOT be accepted for credit in another course. There will be NO exceptions to this rule. Reusing such work will result in immediate failure of the second course. If assignments for two different courses are related in any way and the student has questions about whether the second project is permissible, the matter must

be discussed with all instructors involved. This will prevent any possible unintentional violation of this rule.

3.4) As with punctuality, assignments must be submitted on time. Any late submission will result in a reduction of the grade for that assignment.

3.5) Failure to comply with the provisions set out above will result in the loss of the corresponding course credits for the course in which these rules have been violated.

3.6) If you have a documented special need that requires academic accommodations (SDAC), it must be certified by your home institution. Please contact the Head of Studies in Valencia, María Andrés ([maria.andres@uvavalencia.org](mailto:maria.andres@uvavalencia.org)).

### 4) Activities, Workshops, and Lectures

Throughout the course, various activities, workshops, and lectures are organized. Participation may be voluntary or mandatory if the instructor considers the activity relevant to the course.

#### 5) Classroom Conduct

5.1) It is very important that all students arrive to class on time, prepared, and with the materials needed for the day. During class, students must treat one another and the instructor with respect, demonstrate a positive attitude, and help create a participatory and collaborative environment that supports effective learning. Any violation of these expectations will have direct consequences.

5.2) Electronic devices (laptop, mobile phone, smartwatch) may be used in class only for course-related purposes. If a student uses such technology for personal reasons during class, the student may be penalized with an unexcused absence.

5.3) The use of computer or electronic technology during examinations is prohibited unless the instructor determines otherwise in accordance with the examination format.

#### 6) Course Content

On occasion, and always within the context of the course, certain “sensitive” topics may be addressed both inside and outside the classroom. Therefore, if a student feels offended by such content in a particular class, the student may leave the class, and doing so will not have any negative effect whatsoever on the final grade. Faculty members will always be open to communication and dialogue in order to promote better intercultural understanding.

#### 7) Final Clarification

The instructor may modify or add activities and/or change the dates indicated according to the learning needs of the group. Effective learning requires not only careful planning, but also a certain degree of flexibility.