WELCOME TO
COMPUTER SCIENCE 1027b

COMPUTER SCIENCE
FUNDAMENTALS II

Lecturers:

John Barron (001)
James Hughes (002)
What is CS1027 about?

Main focus:

• The organization and manipulation of data
• Choosing how to organize data: into collections such as
  • stacks
  • queues
  • lists – similar to python lists
  • trees
A Stack of Plates

New plate is added at the top of the stack, and will be the first one removed
A Queue of People

First person served will be the one at the front of queue

New person is added to the rear of the queue
A List of Numbers

This is an example of an Ordered List, so a new number must be added such that the numbers remain in order.
...What is CS1027 about?

Collections
(aka Abstract Data Types)

• What would we use them for?
• Why would we use them?
• How are they implemented?
What is CS1027 about?

plus:

• Sorting and searching techniques
• Analysis of algorithms
• Recursion \((\text{methods calling themselves})\)

and, continuing from CS1025 / 1026:

• Good object-oriented design
• Good programming practices
COMPUTING ENVIRONMENT

• Our Programming will be done in **Java 8**

• Our Java computing environment for CS1027 is **Eclipse**
  • A “real” IDE (DrJava in CS1026 is a pedagogical environment. Pycharm Edu is a lightweight IDE)
Should you be here?

- **Prerequisite:**
  Comp Sci 1025a/b or 1026a/b

- *You should be comfortable with programming syntax in Python or Java.*

- *Note:* “Unless you have either the prerequisite for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees.” Instructor Permission is also acceptable
COURSE TOPICS

• Revisit Object-Oriented programming
• Object-Oriented design concepts: *inheritance*
• Abstract data types and their implementations: *stacks, queues, lists, trees*
• Recursion
• Analysis of algorithms
• Sorting and searching techniques
ADMINISTRATIVE DETAILS

Textbook


• There is a copy on 1-day reserve in the Taylor Library (NatSci building)
CS 1027b Website

- [http://www.csd.uwo.ca/courses/CS1027b](http://www.csd.uwo.ca/courses/CS1027b)
- Contains course related information:
  - Lecture notes
  - Lab instructions
  - Assignments
  - Links to other sites
  - Sample code
- Check it frequently for announcements
- OWL will contain all relevant information as well!
Lecture Notes

• Available from the CS1027b website
• They are copies of the slides used in class, and are intended to help in note-taking during lectures
• They are **NOT** a substitute for attending lectures
• There may be other material presented in lectures also
Textbook Code

• We will discuss many code samples in class
  • Can be ftp’d from the textbook website
  • Most will be available on the CS1027b website
• It may help you to have paper copies of the sample code in class
Labs

• 1 lab hour per week, in computer lab room (MC 235)
• Labs start on Monday January 11 2016
• Purpose of labs: to introduce or expand on practical material + programming exercises
• Lab instructions will be posted on the course website
  • Read through the lab instructions before coming to the lab.
  • Do the pre-lab preparation.
  • Bring a printed copy of the lab instructions to the lab.
Computing Facilities

CSD First Year Teaching Environment

• FYTE computer labs are in Middlesex College Rooms 8, 10, 230, 235

• Logging in to FYTE
  • Use your GAUL user name and password
    • User name is same as that assigned to you by UWO (your “uwo” account)
    • Password emailed to your uwo account (same as your CS1025a/1026a password)

• By using your first-year account, you agree to abide by the Department's Rules of Ethical Conduct
Email contact

• **Email from me to you:**
  • Course email will be sent to your **uwo** email accounts
  • You are responsible for information sent via email to your account
  • See caveats in Course Outline re: forwarding email and mailboxes filling up

• **Email from you to me:**
  • Feel free to email me with **brief** questions re. lecture material or clarification of assignments
  • Send email from your **uwo** account
  • Please include “**CS1027**” in the Subject line
  • Please use plaintext format
# Student Evaluation

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Weight</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>9 %</td>
<td>due Jan. 24</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>9 %</td>
<td>due Feb. 07</td>
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<tr>
<td>Assignment 3</td>
<td>9 %</td>
<td>due Mar. 06</td>
</tr>
<tr>
<td>Assignment 4</td>
<td>8 %</td>
<td>due Apr. 03</td>
</tr>
<tr>
<td>Labs</td>
<td>10%</td>
<td>weekly</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20 %</td>
<td>March 7</td>
</tr>
<tr>
<td>Final Exam</td>
<td>35 %</td>
<td>TBA</td>
</tr>
</tbody>
</table>
Important Conditions

To pass the course:
• Final Exam mark must be at least 45%
• Weighted average of assignments must be at least 45%
• Otherwise your maximum course grade is 45%

To achieve a final grade of 65% or higher:
• Final Exam mark must be at least 50%
• Weighted average of assignments must be at least 50%
• Otherwise your maximum course grade is 60%
Midterm Exam

March 5th 10am - 12pm

• There is *no* makeup midterm exam, except for students requesting a Special Midterm Exam for religious reasons (must request a Special Midterm Exam and file documentation with their Dean’s office at least *two weeks* before the midterm exam date)

• If you do not write the midterm exam, the weight of the midterm exam will be shifted to the final exam

• If your final exam mark is higher than your midterm exam mark, the weight of the midterm exam will be shifted to the final exam!
Labs

• Labs are worth 10% of your final mark
• Each completed lab is worth 1% (evaluated by the TA in your lab session)
  • But, there are more than 10 labs; so, lab mark is based on best 10 of your individual lab marks
• You must attend the lab session for which you are registered
• There are no makeup labs
  • In cases of lengthy / serious illness, contact your Dean’s office
Programming Assignments

Assignment Submission: details will be posted on our website

Late Assignments:
• Late penalty is 10 % of the max. assignment mark per day late
• Maximum two days late
• No extensions given
• In cases of lengthy illness etc. take documentation to your Dean’s office
Assignment Marking

• Done by a Teaching Assistant (TA)
• 8 day limit time limit on requesting adjustment in an assignment mark
• Keep a duplicate copy of all your assignments, just in case …
Ethical Conduct

• Assignments are to be completed by individuals, not pairs or groups.
• Discussing approaches to problems is OK, but writing code that looks the same is not!
• Collaboration that results in assignments that are more than coincidentally alike is unacceptable and will be regarded as an occurrence of academic dishonesty.
What is academic dishonesty?

- Collaboration
- Copying another student's assignment
- Allowing another student to copy
- Altering of assignment results

**Penalty for academic dishonesty:** reported to Dean, penalty starts at 0% for the assignment in question
Java vs Python

- 1026 now uses Python so why are we switching to Java?
- OR why does 1026 now use Python when 1027 is in Java?
- 4 /5 TOP used programming languages are statically typed (Python is 5th)
- Java allows us to look more under the hood to see how things are done
- For example: how are lists dynamically expanded in python?
Java vs Python

A classic example in both Python and Java

Java:
```java
public class HelloWorld {
    public static void main(String [] args){
        System.out.println("Hello World");
    }
}
```

Python:
```python
print("Hello World")
```

What is public? What is class? What is static? What is void? What is String [] args?

Python allows us to teach concepts without losing students in syntax
Java vs Python

Speed?  
Source: http://benchmarksgame.alioth.debian.org/

<table>
<thead>
<tr>
<th>Program</th>
<th>Java</th>
<th>Python</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generate Pi Digits to 10000</td>
<td>3.12 seconds</td>
<td>2.20 seconds</td>
</tr>
<tr>
<td>Binary Tree stress test</td>
<td>5.75 seconds</td>
<td>152.06 seconds</td>
</tr>
<tr>
<td>n-body simulation</td>
<td>22.66 seconds</td>
<td>923.74 seconds</td>
</tr>
</tbody>
</table>
Java vs Python

Additional Links

Infographic of Java vs Python
http://bit.ly/1LLoBgq

Another speed test
http://bit.ly/1Otrvfo

Programming language rankings
Questions you may have ...

• Do I need to buy the textbook?

• Is this course hard?

Other questions?