

# CS250 Intro to CS II

Chadd Williams

chadd@pacific.edu

Strain 202

Office hours: TTh 1-3pm  
Or by appointment

# Welcome!

---

- Web Page <http://zeus.cs.pacificu.edu/chadd/cs250s16>
  - Syllabus
  - Calendar
  - Text Book
  - Visual Studio 2013
- Your projects must reside on [\\grace.cs.pacificu.edu](http://grace.cs.pacificu.edu) for me to look at them.

# Progression!

---

- CS 150
  - C++ mechanics
  - Visual Studio mechanics, Debugger
- CS 250
  - C++ mechanics (structs, classes)
  - Object oriented programming and design
  - Graphics (SDL 2)
- CS 485 (Spring 2017)
  - C++ mechanics (C++11, C++14, templates, STL)
  - Object oriented design
  - Design patterns

# What I think you know

---

- Variables & data types
- Relational & logical operators
- Decision statements
- Repetition statements including nesting
- Functions
- Files
- Arrays
- Character processing
- Visual Studio
- Debugger

# This class

---

- More C++ mechanics
  - Arrays
  - Structs
  - Classes
- Graphics programming
  - SDL
- Object Oriented Design

# Review

---

- Review Reading: pp. 265-284 (files)  
pp. 377-425 (arrays)
- Topics to Review
  - Files (Reading & Writing)
  - Arrays (1D & 2D)
  - Character Processing

# Files

---

- What is a stream?
- How do we create a stream for reading from a file?

# One-dimensional arrays

---

- Consider

```
int intArray[] = {1, 2, 3, 4, 5};
```

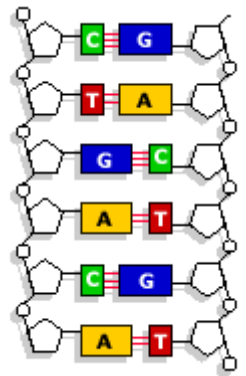
```
double doubleArray[10];
```

1. What are the index values for each array?
2. How many elements does each array have?
3. Arrays consist of *homogeneous* data. What does this mean?



# Problem #1

## DNA Length



- A DNA string represents the order of nucleobases along one strand of a double-stranded DNA molecule
- The other strand is the ***reverse complement*** of the string
- DNA strings are constructed from the alphabet  $\{A, C, G, T\}$  representing the bases adenine, cytosine, guanine, and thymine

# Problem #1

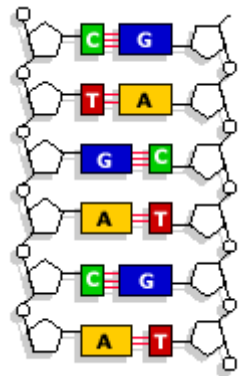
## DNA Length

---

- The DNA string AAGATGCCGT has length 10 nucleobases (or just bases)
- Write a function **getDNALength** that accepts a character array (that ends with null) and returns the length of a DNA string

# Problem #2

## Reverse Complement



- In DNA strings, the symbols A and T are complements of each other as are C and G
- The reverse complement of a DNA string  $s$  is formed by reversing the contents of  $s$  and then taking the complement of each symbol
- The DNA string AAAACCCGGT has the reverse complement ACCGGGTTTT

# Problem #2

## Reverse Complement

---

- The data file dnastrings.txt contains an unknown number of DNA strings where each string has length at most 1000 bases
- Write a program to output
  - each DNA string
  - the reverse complement of each DNA string
- Let's write
  - well-defined function prototypes
  - each function definition
  - main function for solving the stated problem