Welcome to CSE 142!
What is computer science?

- computers?
- science?
- programming?
- late lonely nights in front of the computer?

**ALGORITHMIC THINKING**

**algorithm:**
a step-by-step procedure for solving a problem or accomplishing some end especially by a computer
Fields of computer science

- Graphics
- Computer Vision
- Artificial Intelligence
- Robotics
- Data Mining
- Natural Language Processing
- User Interfaces
- ...

How does this all relate to programming?
- This course is “Introduction to Programming I” after all.
What is programming?

- **program**: A set of instructions to be carried out by a computer.

- **program execution**: The act of carrying out the instructions contained in a program.

- **programming language**: A systematic set of rules used to describe computations in a format that is editable by humans.
  - We will be studying a programming language called Java.
Programming is like Legos...
Should you take this course?

- No
  - “I hate computers.”
  - “I don’t pay attention to details.”
    - Programming is fairly detail-oriented.
  - “I refuse to think logically.”
  - “I want to take an easy class.”
    - Hard for those who find difficulty in logical thinking and who don’t pay attention to details.
Should you take this course?

• Probably not
  • “I want free gourmet meals and to make lots of money by working for Google.”
  • “Candy Crush is awesome!”
  • “If I wrote WhatsApp, I would have made how many billion dollars???”

• Yes
  • “I have to take this class.”
    • Is this the only reason? Are you pursuing the right major?
  • “I like to solve problems.”
  • “Computers and robots are going to take over the world. I want to befriend them so that my life will be spared.”
Tips for Success

- Visit website often: http://cs.washington.edu/142
- Read syllabus carefully
- Do lots of problems on http://practiceit.cs.washington.edu/
- If you're stuck, review lecture and book examples
- Remember: assignments must be your own work!
Tips for Success (cont’d)

- Keep up with the assignments
  - The course material is cumulative
  - From a former student: “Procrastination will eventually come around to bite you in the ass!”

- If you don’t understand something, ask questions (especially “WHY?”).
  - “There’s no such thing as a dumb question.”
  - Computers are neither magical nor mysterious. Everything can be explained!
Building Java Programs

Chapter 1
Lecture 1-1: Introduction; Basic Java Programs

reading: 1.1 - 1.3
Your first Java program!

```java
public class Hello {
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}
```

- File must be named `Hello.java`

- What does this code output (print to the user) when you run (execute) it?
Running a program

1. Write it.
   - **code** or **source code**: The set of instructions in a program.

2. Compile it.
   - **compile**: Translate a program from one language to another.
   - **byte code**: The Java compiler converts your code into a format named byte code that runs on many computer types.

3. Run (execute) it.
   - **output**: The messages printed to the user by a program.
public class Hello {
    public static void main(String[] args) {
        System.out.println("Hello, world!");
        System.out.println();
        System.out.println("This program produces");
        System.out.println("four lines of output");
    }
}

- Its output:
  Hello, world!
  This program produces
  four lines of output

- **console**: Text box into which the program's output is printed.
Every executable Java program consists of a **class**, that contains a **method** named **main**, that contains the **statements** (commands) to be executed.
Names and identifiers

• You must give your program a name.

```java
public class HelloWorld {

• Naming convention: capitalize each word (e.g. MyClassName)
• Your program's file must match exactly (HelloWorld.java)
  • includes capitalization (Java is "case-sensitive")

• identifier: A name given to an item in your program.
  • must start with a letter or _ or $
  • subsequent characters can be any of those or a number
  • **legal:** _myName  TheCure  ANSWER_IS_42  $bling$
  • **illegal:** me+u  49ers  side-swipe  Ph.D's
```
Keywords

- **keyword**: An identifier that you cannot use because it already has a reserved meaning in Java.

```
abstract    default    if            private
boolean     do         implements  protected
break       double     import       public
byte        else       instanceof  return
case        extends    int          short
catch       final      interface    static
char        finally    long         strictfp
**class**   float      native       super
const       for        new          switch
continue    goto       package     synchronized
```

- **Note**: Because Java is case-sensitive, you could technically use `Class` or `cLaSs` as identifiers, but this is very confusing and thus **strongly discouraged.**
System.out.println

- A statement that prints a line of output on the console.
  - pronounced "print-linn"

- Two ways to use `System.out.println`:
  - `System.out.println("text");`
    Prints the given message as output.
  - `System.out.println();`
    Prints a blank line of output.
Syntax

- **syntax**: The set of legal structures and commands that can be used in a particular language.
  - The “spelling” and “grammar” of a programming language.
  - Every basic Java statement ends with a semicolon ;
  - The contents of a class or method occur between { and }

- **syntax error (compiler error)**: A problem in the structure of a program that causes the compiler to fail.
  - Missing semicolon
  - Too many or too few { } braces
  - Class and file names do not match
  - ...
Syntax error example

```java
public class Hello {
    pooblic static void main(String[] args) {
        System.owt.println("Hello, world!")
    }
}
```

- **Compiler output:**

  ```
  Hello.java:2: <identifier> expected
  pooblic static void main(String[] args) {
      ^
  Hello.java:3: ';' expected
  } ^
  2 errors
  ```

- The compiler shows the line number where it found the error.
- The error messages can be tough to understand!
  - Why can’t the computer just say “You misspelled ‘public’”?
First lesson in this class

- Computers are stupid.
- Computers can’t read minds.
- Computers don’t make mistakes.
- If the computer is not doing what you want, it’s because **YOU** made a mistake.
More on syntax errors

- Java is case-sensitive
  - Hello and hello are not the same

```java
1 public class Hello {
2   public static void main(String[] args) {
3     System.out.println("Hello, world!");
4   }
5 }
```

compiler output:

```
Hello.java:1: class, interface, or enum expected
Public class Hello {
^
1 error
```
Strings and escape sequences
Strings

- **string**: A sequence of text characters.
  - Starts and ends with a " (quotation mark character).
    - The quotes do not appear in the output.
  - Examples:
    "hello"
    "This is a string. It's very long!"

- Restrictions:
  - May not span multiple lines.
    "This is not a legal String."
  - May not contain a " character.
    "This is not a "legal" String either."

- This begs the question...
Escape sequences

- **escape sequence**: A special sequence of characters used to represent certain special characters in a string.

  - `\t` tab character
  - `\n` new line character
  - `"` quotation mark character
  - `\` backslash character

- **Example:**
  ```java
  System.out.println("\\hello\\n\\t\\"\\"\\you\\"?\\\\");
  ```

- **Output:**
  ```java
  \hello
  how are "you"?
  ```
Questions

• What is the output of the following `println` statements?

```java
System.out.println("\ta\tb\tc");
System.out.println("\\\\");
System.out.println("\"");
System.out.println("\\\\\\\\\\"nten\\\\nthe downward spiral");
```

• Write a `println` statement to produce this output:

```
/ \ // \ \ /// \ \ \ 
```
Answers

- **Output of each `println` statement:**

  \[
  \begin{array}{ccc}
  a & b & c \\
  \end{array}
  \]

- **`println` statement to produce the line of output:**

  ```java
  System.out.println("/
  \//
  \///
  ////
  /////");
  ```
Questions

• What `println` statements will generate this output?

This quote is from Irish poet Oscar Wilde:

"Music makes one feel so romantic - at least it always gets on one's nerves - which is the same thing nowadays."

• What `println` statements will generate this output?

A "quoted" String is 'much' better if you learn the rules of "escape sequences."

Also, "" represents an empty String. Don't forget: use "\" instead of "! "" is not the same as ""
Answers

- **println statements to generate the output:**

  ```java
  System.out.println("This quote is from");
  System.out.println("Irish poet Oscar Wilde:");
  System.out.println();
  System.out.println("\"Music makes one feel so romantic\";
  System.out.println("- at least it always gets on one's nerves -");
  System.out.println("which is the same thing nowadays.\"\");  
  ```

- **println statements to generate the output:**

  ```java
  System.out.println("A \"quoted\" String is");
  System.out.println("'much' better if you learn");
  System.out.println("the rules of \"escape sequences.\"");
  System.out.println();
  System.out.println("Also, \"\" represents an empty String.");
  System.out.println("Don't forget: use \\
  instead of \" !");
  System.out.println("'\' is not the same as \\");
  ```