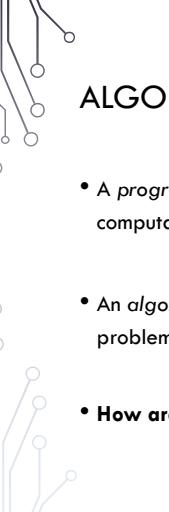




CLASS 04

TYPES, VARIABLES AND ASSIGNMENTS

COMP 130 – INTRODUCTION TO COMPUTING
DICKINSON COLLEGE



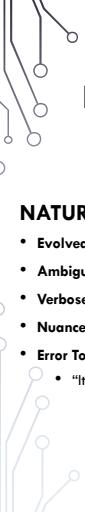
ALGORITHMS & PROGRAMS

- A *program* is a sequence of instructions that specifies how to perform a computation.
- An *algorithm* is a set of steps that when followed produce a solution to a problem.
- **How are programs and algorithms related?**



WHY LEARN TO PROGRAM?

- **The practical:** Job skills, make money...
- **From a Liberal Arts perspective:** it is a very good way to develop general problem-solving skills...
 - Problem formulation
 - Creative thinking
 - Problem decomposition
 - Clear and accurate communication
 - Helps us to understand and make a difference in the modern world

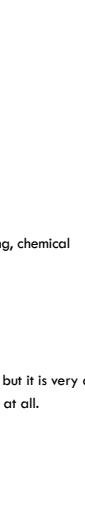


NATURAL & FORMAL LANGUAGES



NATURAL LANGUAGES

- **Evolved naturally:** French, Arabic, Swahili, Hindi, Chinese, ...
- **Ambiguous:** "Call me an Uber."
- **Verbose:** "I need to get home. Call me an Uber."
- **Nuanced** (idioms/metaphors): "Go back to the drawing board."
- **Error Tolerant:**
 - "It is the the meaning that is important."



FORMAL LANGUAGES

- **Designed by humans:** math, programming, chemical
- **Precise:** $8 / 2 * (2 + 2)$
- **Concise:** $8 / 2 ^ 2 + 2$
- **Literal:** `print("Hello world")`
- **Not Error Tolerant:**
 - $8 // 2 * (2 - 2)$: Still has meaning but it is very different.
 - $8 \text{ d } 2 \times [2 \text{ plus } 2]$: Has no meaning at all.

PROGRAMMING LANGUAGES

- A *programming language* is a formal language used to express algorithms for computers (i.e. to write programs).
 - Some you might hear of: Java / C / C++ / C# / Swift / JavaScript / VisualBasic / Python
 - Tons of them....
- A (*Python*) *Interpreter* is a program that reads a program written in a programming language (*Python*) and tells the underlying computer hardware what to do.
 - i.e. it *runs* (or *executes*) programs

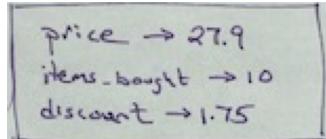
PYTHON VARIABLES AND ASSIGNMENT STATEMENTS

```
price=27.9  
items_bought=10  
discount=1.75
```

PYTHON VARIABLES AND ASSIGNMENT STATEMENTS

```
price=27.9  
items_bought=10  
discount=1.75
```

State Diagram



PYTHON VARIABLES AND ASSIGNMENT STATEMENTS

```
price=27.9  
items_bought=10  
discount=1.75
```

```
total_cost=price * items_bought - discount
```

```
print(total_cost)
```

State Diagram

