

# **NWEN 241**

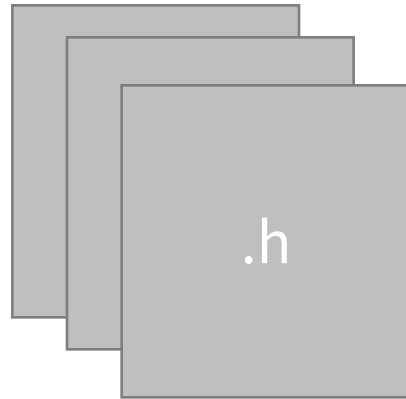
# **Systems Programming**

Week 2 Tutorial

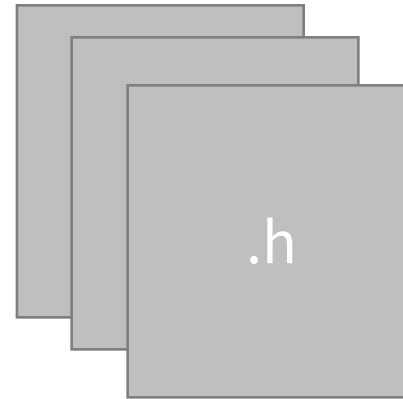
# Admin Stuff

- ECS Managed Discord (moderated by NWEN241 tutors)
  - Managed by Simon McCallum and shared with COMP261
  - <https://discord.gg/DWtDFuJ3>

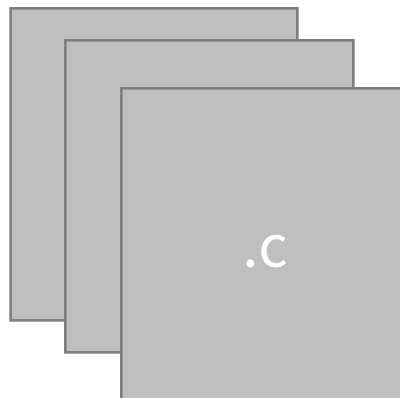
# Recall: Large C Program



Header files  
from standard  
C library



Own header files



Source files

# Function-Like Macro

## Macro

```
#define SQ(x) x * x
```

```
#define SQ(x) (x) * (x)
```

```
#define SQ(x) ((x) * (x))
```

## Example Problematic Usage

```
SQ(1+1)
```

```
(int)SQ(2.0) % 2
```

```
SQ(i++)
```

```
SQ(f())
```

# Arrays

- Arrays are second class citizens
- With an array, you can NOT:
  - Change the size after initialization
  - Assign a new array using '='
- In addition, arrays automatically 'decay' into pointers, losing information about their size (with few exceptions).
  - More on array decay next week (after you learn pointers)!

# 2D Arrays

- Multi-dimensional arrays are typically contiguous.

```
int arr[3][4] = {{1, 2, 3, 4},{5, 6, 7, 8},{9, 10, 11, 12}};  
int i = arr[1][2];
```



- They also need additional information to index into the correct position. When passed to a function for example, it needs to know how many values to ‘skip’ to get to an inner array.

# Strings

- `long int strlen(const char* source);`
  - Calculates the length of a given string, up to the first null character.
- `char* strcpy(char* destination, const char* source);`
  - Copies the source string to the destination character array.
- `int strcmp (const char* str1, const char* str2);`
  - Compares two strings and returns 0 if both strings are identical.
- `char *strcat(char *dest, const char *src);`
  - Concatenates two strings and stores the result in the first argument.