CS241 #01 Welcome!

0. Learning Objectives:

Interact with OS in C via ***system*** *calls*
Understand how OS allocates, deallocates and accesses memory
Understand and use ***virtual memory***
Create, use, manipulate ***processes*** *and* ***threads***
Understand how OS ***schedules*** *processes and threads*
Communicate and ***synchronize*** *between threads and processes*
Determine when ***deadlock and race conditions*** *may occur and how to avoid them*
Manipulate ***filesystem*** *structures (inodes etc)*
Communicate across ***networks***

1. Why is CS241 hard? Aka "*Look Mom no training wheels!*"

2. What's the difference between a program image and a process?

Can we sketch overleaf the contents of the address space of a process? include Environment, Program Arguments, Stack, Heap, Unitialized vars, Initialized vars, Code

3. Things to get up to speed on before we can talk about threads or system calls in detail

C != C++;
Lifetime of variables;
Arrays;
Buffered I/O;
Pointers- Use of * and &
C string gotchas;
Heap memory allocation

C library I/O (`fprintf,fopen,puts,getchar`...) uses low level POSIX calls (`read,write,open`)

4. Explain what is going on in each line and how many bytes are allocated and where.

```
void test() {
  char* t1 = "hi";
  char t2[] = "ab";

 *t2 = 'A';
 *(t2 + 1) = 'B';
 t2[1] = 'B';
 *t1 ='H';
}
```

5. Can one process create another process?

6. What is `sizeof(int)`?

7. What is `sizeof(char)`?

8. What is `sizeof(char*)` ?

9. `int A[8]`; So what is `sizeof(A)`?

10. What are `malloc`, `calloc`, `realloc` and `free`? Why are they hard?

11. A program calls `printf("Hello")`
when does the C library call `write`?

12. MPs, lab assignments, Piazza policy. Honors course

13. `strtok, strcpy, strcmp, memset, memmove`?