

0. About the course:

Interact with OS in C via **system** calls

Understand how OS allocates, deallocates and accesses memory

Understand **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?

Overleaf, sketch the contents of the address space of a process:

You should include at least Environment, Program

Arguments, Stack, Heap, Uninitialized 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;

Use of * and &

C string gotchas;

heap memory allocation

C library I/O (fprintf, fopen, puts, getchar...)

uses lower level posix calls (read, write, open)

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

```
01 void test() {
02     char* t1 = "hi";
03     char t2[] = "ab";
04
05     *t2 = 'A';
06     *(t2 + 1) = 'B';
07     t2[1] = 'B';
08     *t1 = 'H';
09 }
```

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]; What is sizeof(A) ?

10. How many system programmers does it take to change a lightbulb?

11. What are malloc, calloc, realloc and free?

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

13 MPs, lab assignments, Ed. Honors course. Peer tutoring

Environment, Program Arguments, Stack, Heap, Uninitialized vars, Initialized vars, Code