

Graphics Programming Course Notes

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Week 1

Key Concepts

- explain how transformations work
- describe how classes work
- use transformations to program a basic solar system

Welcome to graphics programming

We will use `p5.js` and the `brackets.io` editor.

Getting started on the module

Download the `emptyExample.zip` file from the link provided.

Basically, it's a follow-along coding session. A good remark is to refer to the documentation whenever we have doubts.

Using transformations

A `p5.js` sketch is made out of a canvas whose pixels can be addressed much like on a graph paper.

We can use `scale()`, `translate()`, and `rotate()` to apply transformations to the canvas. The functions `push()` and `pop()` let us create a *sandbox* of where transformations and styles will be applied.

Object Oriented Programming in Javascript (OOP)

Using the `class` keyword, we can define classes in JavaScript.

Week 2

Key Concepts

- describe how vectors work
- apply vector arithmetic
- implement simple systems that use vectors

Using vectors

Vectors have a direction and a magnitude. The `p5.js` library has a `vector` class for us to use.

Instead of calculating and updating each component of position, velocity, acceleration, friction, we can use vectors to raise the level of abstraction.

We can create a new vector with `createVector()` function.

Vector addition and subtraction

To add two vectors, we use the `add()` function which is part of the vector. Similarly for subtraction, we use the `sub()` function.

For example:

```
1 function draw() {  
2   vec = createVector(width / 2, height / 2);  
3   vec2 = p5.Vector.random2D();  
4  
5   vec.add(vec2);  
6   v2.sub(vec);  
7 }
```

Vector scaling

To scale a vector, we can multiply or divide the vector by a scalar. We can achieve this with `mult()` and `div()` functions.

Calculating magnitude and normalising

We can get the magnitude with `mag()`. We can normalize a vector with `normalize()`.

Acceleration 101

Acceleration is the rate of change of velocity of an object over time. Velocity is the rate of change of the location of an object over time.

When we want to update location based on velocity in p5.js we use:

```
1 location.add(velocity)
```

Similarly, when we want to update velocity based on acceleration, we use:

```
1 velocity.add(acceleration)
```