# CREATIVE PROGRAMMING 2

## DETAILS

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|---|---|
| Instructor | Prof. Jeff Thompson |
| Email | jeff.thompson@stevens.edu |
| Office/hours | Morton 208, Thursdays 10.00am–12.00pm |
| Meeting times | Thursdays 1.00–4.50pm |
| Location | Visual Arts & Technology Studio, Morton 203 |
| Course materials | https://github.com/jeffthompson/creativeprogramming2 |

## COURSE DESCRIPTION

In this intermediate course, we'll build on creative uses of computer programming, with a focus on tools and processes for making more technically, creatively, and conceptually complex projects. You'll develop a series of projects examining images, cameras, computer vision, interactivity, and machine learning, as well as continue building a personal, creative practice. Like in Creative Programming 1, we'll also look at historical, contemporary, and theoretical issues around computation in the arts and our culture.

## ATTENDANCE

Because this class will cover so much technical material, and because our process of experimentation and critique is collaborative, attendance is mandatory. You are allowed two absences per semester to use at your discretion – each additional absence will result in your final grade being lowered by ½-letter. Late arrivals will be marked tardy, with 3 tardies equaling one absence. The only exception is severe illness – if this is the case, please let me know as soon as possible and provide a doctor's note documenting your illness.

## HOMEWORK

Homework in this class is meant to be exploratory, a way to expand on the experiences and ideas in class. I encourage wide-ranging interpretation of assignments: consider ways that you can complete the project that are creatively and intellectually exciting for you, not fulfilling the basic requirements. (That said, some assignments will have restrictions on them – these kinds of constraints can spur creativity, so embrace them!) Because this is

an intermediate class, you should be pushing your work further: creatively, technically, and conceptually.

Unlike tests, projects require considerable engagement and thoughtful work on your own, and I want to see you working each week on projects. All assignments are due by the start of class and should be turned in on Canvas – late projects will be marked down 10 points for each week they are late. Details of projects will be available on the class GitHub page (see link on the first page of this syllabus) including details about how to turn in specific projects, what's to be included, etc.

You will have 24/7 access to the Lab and Studio, and use of the Fab Lab during open hours for printing and equipment checkout.

## GRADING

The goal of all assignments is for you to think and make. Everyone comes from a different background and experience, so I'll be looking for improvement, curiosity, engagement, and a willingness to experiment. A grading rubric will be provided with each assignment to help you understand what is expected and how you did.

To get a C (an average grade) you should:

- Put time into your projects each week
- Complete everything on time
- Participate in critiques and discussions

For a B or an A, you should additionally:

- Take risks and try things enthusiastically
- Be an active and unsolicited participant in critiques and discussions
- Take assignments beyond their minimum requirements

Final grades will be determined as follows:

- Homework 60%
- Class participation 25%
- Final project 15%

## REQUIRED MATERIALS

Required and suggested readings will be provided as PDFs on GitHub – there is no required textbook.

- Laptop capable of running class projects and code, power charger, and reliable internet connection – *bring every week, please!*
- External webcam, if your laptop doesn't have one built in (or it doesn't work). You may want to purchase an external one for class projects anyway, though we'll talk more about cameras in a few weeks, so don't get one now unless yours is broken.
- We will be using only free software during the semester: Chrome and Javascript, Processing, Python, and several machine learning libraries
- A sketchbook for taking notes and drawing ideas – *bring every week, too!* You'll be asked to do regular drawings in preparation for assignments.
- An assortment of drawing/writing implements for working on project ideas
- Other art supplies (paper, etc) and printing as needed

## LEARNING ACCOMMODATIONS

The goal of this class is for everyone to succeed. Stevens and the VA&T program are dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

If you have any questions about learning accommodations, please don't hesitate to talk with me during or outside of class.

## PRONOUNS

As this course includes lots of interaction between students, it's important for us to create an environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronouns and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform me of the necessary changes.

## INCLUSION STATEMENT

Stevens and the VA&T program believe that diversity and inclusiveness are essential to excellence in academic discourse and creativity. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to me to make alternative arrangements.

## COURSE CALENDAR

Please note this is subject to change – be sure to check GitHub and your email regularly. Homework and readings are listed for the days they are assigned.

| **WEEK 1** | **JAVASCRIPT 1** |
|---|---|
| Topics | JavaScript basics, CSS and the DOM |
| Reading | Selections from *Network*s (Larsen) |
| Homework | *Browser Extension* ideation, sign up for GitHub and install Desktop Client |

| **WEEK 2** | **JAVASCRIPT 2** |
|---|---|
| Topics | More JavaScript demos, creating GitHub repositories |
| Homework | Finish *Browser Extension*, create repository and upload code |

| **WEEK 3** | **IMAGE PROCESSING 1** |
|---|---|
| Topics | Camera input, accessing pixel values |
| Reading | Peruse *Practical Handbook of Image Processing Algorithms In C* |
| Homework | *Digital Mirror* sketches, sign up for Vimeo or YouTube |

| **WEEK 4** | **IMAGE PROCESSING 2** |
|---|---|
| Topics | Image processing, screen recording and documenting projects |
| Homework | Finish *Digital Mirror* project, record a video of it, install OpenCV for Processing |

| **WEEK 5** | **COMPUTER VISION 1** |
|---|---|
| Topics | Extracting information from images, kernel processing, edge detection |
| Homework | *Tracking* project sketches |

| **WEEK 6** | **COMPUTER VISION 2** |
|---|---|
| Topics | Detecting colors and blobs, cameras for installations |
| Homework | *Tracking* project work-in-progress |

**WEEK 7** **COMPUTER VISION 3**

Topics Detecting faces, training cascades

Reading *Artificial Intelligence's White Guy Problem* (Crawford), *The Unreasonable Effectiveness of Recurrent Neural Networks* (Karpathy), and *Mathwashing, Facebook, and the Zeitgeist of Data Worship* (Woods)

Homework Finish *Tracking* project

**WEEK 8** **HISTORY AND CONTEXT OF MACHINE LEARNING**

Topics A brief history of machine learning, discussion of readings

Homework *Faces* project sketches, install libraries and datasets

**MARCH 15** **SPRING BREAK – NO CLASS**

**WEEK 9** **MACHINE LEARNING 1**

Topics Everything's a signal, Python refresher, encoding an image as a vector

Homework *Faces* project work-in-progress, install libraries and datasets

**WEEK 10** **MACHINE LEARNING 2**

Topics Extracting features, feature reduction, searching, RAM limitations

Homework *Faces* project further work-in-progress

**WEEK 11** **MACHINE LEARNING 3/FINAL PROJECT 1**

Topics Visualizing datasets, refining the model

Homework Finish *Faces* project, write Final Project proposal

**WEEK 12** **MACHINE LEARNING 4/FINAL PROJECT 2**

Topics Cluster computing, using Amazon AWS

Homework *Final Project* sketches

**WEEK 13** **FINAL PROJECT 3**

In class Work day

Homework *Final Project* work-in-progress

**WEEK 14** **FINAL PROJECT 4**

In class Work day

Homework *Finish Final* Project

**EXAM** **FINAL CRITIQUE**

Date TBA, please don't book travel until the exam schedule is released!