# Course Missive

*Fall 2019*

**Time and Location:** MWF 12:00-12:50 PM, Salomon Hall 001

## Course Staff

| What | Who | Where | When |
|---|---|---|---|
| Professor | Daniel Ritchie (`dritchi1`) | CIT 445 | TBA |
| Head TAs | Amy Pu (`apu1`) | TBA | TBA |
| | Brian Oppenheim (`boppenhe`) | TBA | TBA |
| | Zachary Horvitz (`zhorvitz`) | TBA | TBA |
| Undergraduate TAs | Abaho Katabarwa (`akatabar`) | TBA | TBA |
| | Antony Sagayaraj (`asagayar`) | TBA | TBA |
| | Brendan Le (`ble2`) | TBA | TBA |
| | Bryce Blinn (`bblinn`) | TBA | TBA |
| | Daniel Ritter (`dritter1`) | TBA | TBA |
| | Daniel Kotroco (`dkotroco`) | TBA | TBA |
| | David Oyeka (`doyeka`) | TBA | TBA |
| | David Wang (`dwang33`) | TBA | TBA |
| | James Okun (`jokun1`) | TBA | TBA |
| | James Wang (`jwang78`) | TBA | TBA |
| | Jessica Dai (`jdai6`) | TBA | TBA |
| | Josh Roy (`jroy1`) | TBA | TBA |
| | Joshua Levin (`jlevin1`) | TBA | TBA |
| | Kevin Du (`kdu3`) | TBA | TBA |
| | Mounika Dandu (`mdandu`) | TBA | TBA |
| | Nathaniel Ostrer (`nostrer`) | TBA | TBA |
| | Naveen Srinivasan (`nsriniv1`) | TBA | TBA |
| | Patrick Zhang (`pzhang15`) | TBA | TBA |
| | Pavlo Lyalyutskyy (`plyalyut`) | TBA | TBA |
| | Petar Peshev (`ppeshev`) | TBA | TBA |
| | Rohin Bhushan (`rbhushan`) | TBA | TBA |
| | Shibei Guo (`sguo16`) | TBA | TBA |
| | Siyao Wang (`swang181`) | TBA | TBA |
| | Timothy Ossowski (`tossowsk`) | TBA | TBA |
| | Veda Sunkara (`vsunkara`) | TBA | TBA |
| | Willem Speckmann (`wspeckma`) | TBA | TBA |
| | Xinyang Zhou (`xzhou3`) | TBA | TBA |
| | Xiran Shi (`xshi7`) | TBA | TBA |
| | Yun Ho Kim (`ykim81`) | TBA | TBA |
| | Michael Bardakji (`mbardakj`) | TBA | TBA |
| | Ruochen Zhang (`rzhang73`) | TBA | TBA |
| | Janna Jiang (`jjiang15`) | TBA | TBA |
| | Fabrice Guyot-Sionnest (`fguyotsi`) | TBA | TBA |
| | Eleonora Kiziv (`ekiziv`) | TBA | TBA |

## Introduction

Welcome to CS147! Over the past few years, Deep Learning has become a popular area, with deep neural network methods obtaining state-of-the-art results on applications in computer vision (Self-Driving Cars), natural language processing (Google Translate), and reinforcement learning (AlphaGo). These technologies are having transformative effects on our society, including some undesirable ones (e.g. deep fakes). This course intends to give students a practical understanding of how Deep Learning works, how to implement deep neural networks, and how to apply them ethically. We introduce students to the core concepts of deep neural networks, including the backpropagation algorithm for training neural networks, as well as specific operations such as convolution (in the context of computer vision) and word embeddings and recurrent neural networks (in the context of natural language processing). Throughout the lectures, labs, and assignments, we emphasize and require students to think critically about potential ethical pitfalls that can result from misapplication of these powerful models. The course is taught using the Tensorflow deep learning framework.

## Learning Goals

Students who complete this course will:

- Understand the fundamental algorithms that underly all modern deep learning systems (backpropagation and automatic differentiation)
- Be able to implement deep learning models in Tensorflow
- Know which model architectures to use for processing different types of data (images, sequences, and graphs)
- Have familiarity with training neural networks through supervised learning, unsupervised learning, and reinforcement learning
- Be practiced in critically analyzing the potential societal impacts of the deep networks they develop

## Prerequisites

- A basic programming course: (CSCI 0150, 0170 or 0190)
- A linear algebra course: (CSCI 0530, MATH 0520 or 0540)
- A stats / probability course: (CSCI 0220, 1450, 0450, MATH 1610, APMA 1650 or 1655)

## Assignments

There are seven programming assignments, weekly labs, and a final project. The grade breakdown for this course is:

- 65% – Programming Projects
- 15% – Weekly Labs
- 20% – Final Project

**Note, however, that you must complete all of the programming projects to receive credit for this course.**

Each of the programming projects is due by midnight on the given due date — thus, you have until the end of the day listed as the due date to complete the assignment. You will have four (4) free late days to use towards all but the last project. After your late days are expended you will lose 10% of your project grade for each extra day your handin is delayed. At the end of the term, we will calculate how to best divvy out your late days to best help your final grade. There is no need for you to do anything special for this, other than keep track of submission dates for your own records. Note that because we do this, use of late days will not be reflected in the initial grade report for your assignments.

**Late Policy** Sometimes there are special circumstances during the semester that result in exceptions to this late policy. All such circumstances require an official note from the Deans. In general, they only provide support notes on behalf of students who are experiencing disruptive medical or personal circumstances, including those related to Title IX situations, that affect their ability to do academic work in a timely way. Please send all such notes to the instructor (***do not send them to the HTAs!***).

**You should manage other special circumstances such as interviews, personal travel or extra-curricular factors using the late day policy above.**

## Labs

Students will be assigned to a weekly lab slot. Students will then have an hour to complete the lab for that week and get it checked off by TAs. If they do not complete the lab / get it checked off in that time slot, they can go to another lab section that week to get it checked off.

If a student missess their assigned lab slot, they can also go to another lab section to get the lab checked off. However, this will incur a lab grade penalty (e.g. a 3/4 instead of a 4/4 for that lab). Similarly to the assignment late policy described above, students will be permitted to miss their assigned lab slot three (3) times without penalty.

In all cases, a lab must be checked off at latest by the student's assigned lab slot the following week.

If a student knows well in advance that they will not be able to make their assigned lab slot but will be able to make another slot that week, the student may message their lab TA ***at least 48 hours in advance*** to be temporarily switched into a different lab slot for that week. This will not incur a late lab penalty.

## Programming

This course will use Python and its Tensorflow API. Projects should all be done in Python, and labs will be provided as Google Collaboratory notebooks.

Since this is not a software engineering course, we won't be enforcing stringent style guidelines, but you should write so that someone who isn't a wizard with your langauge of choice will be able to undersand what your program is doing (add plenty of comments, break up code into smaller functions, i.e. apply basic common sense). If you turn in a partially-functional assignment and we can't tell what you were trying to do, we'll probably be very grumpy about giving partial credit.

As that translates to an official policy, so long as your code produces the expected output(s) and adheres to any specific project restrictions (runtime, etc.) then you will not lose points for poor design or coding practices. *However*, as this is not a software design course, it is not the responsibility of the TAs to attempt to understand the intentions underlying confusing code. If it is not fully clear what you were trying to do in the implementation of a paritally-functinoal assignment (i.e. not all of the output is as expected) then partial-credit will be given sparingly, and at our discretion.

## Time Requirements

In addition to 3 hours per week in class, you will probably need 1 hour of help from a UTA, 1 hour for lab, 2 hours of reading and review to solidify your grasp of the material, and 6 hours for the programming assignments. (182 hours/semester)

## Capstone

This course may be used as a capstone course for an Sc.B. degree. Bring a copy of the capstone form (`https://drive.google.com/file/d/1YYK7u4ccB0II52yxXiEI6sMwA7LZMrGy/view`) to the instructor after class or during office hours. All 1470 students who use the course as a capstone will be expected to do fulfill the same final project requirements as students taking 2470.

## Diversity & Inclusion

Our intent is that this course provide a welcoming environment for all students who satisfy the prerequisites. Our TAs have undergone training in diversity and inclusion, and all members of the CS community, including faculty and staff, are expected to treat one another in a professional manner. If you feel you have not been treated in a professional manner by any of the course staff, please contact either the instructor, Ugur Cetintemel (Dept. Chair), Tom Doeppner (Vice Chair) or Laura Dobler (diversity & inclusion staff member). We will take all complaints about unprofessional behavior seriously. Prof. Krishnamurthi has good notes on this area: `http://cs.brown.edu/courses/cs019/2016/professionalism.html`. To access student support services and resources, and to learn more about diversity and inclusion in CS, please visit this webpage: `http://cs.brown.edu/about/diversity/resources/`.

Brown welcomes students from all around the country and the world, and their unique perspectives enrich our learning community. To empower students whose first language is not English, an array of support is available on campus, including language and culture workshops and individual appointments. For more information, contact the English Language Learning Specialists at `ellwriting@brown.edu`.

## Academic Integrity

Academic dishonesty will not be tolerated. This includes cheating, lying about course matters, plagiarism, or helping others commit a violation. Plagiarism includes reproducing the words of others without both the use of quotation marks and citation. Students are reminded of the obligations and expectations associated with the Brown Academic and Student Conduct Codes: `https://www.brown.edu/academics/college/orientation/academic-student-conduct-codes`.

## Collaboration Policy

Discussion of material with your classmates is both permitted and encouraged. However, **showing, copying, or other sharing of actual code is forbidden**. This includes publishing projects on Github or any other public platform. This policy **will** be enforced.

One of the ways that we enforce the collaboration policy is by running MOSS on all homework submissions. For those who are new to the department or otherwise unfamiliar with it, MOSS (short for "measure of software similarity") is a software tool which detects similarities between pieces of code. The course staff manually examines the output of MOSS to look for cases where two students' submitted code is similar in such a way that it is sufficiently unlikely for them to have independently produced it (i.e. an instance of cheating or code plagiarism). The outcome of this process can vary. The instructor may ask to speak to the students in question personally. We may also write up a formal case to be submitted to the Academic Code Committee. None of these things are things you want to have happen to you, so please abide by the terms of our collaboration policy.

## Electronics Policy

The use of electronic devices in class—including laptops, tablets, and mobile phones—is discouraged, except as part of specific in-class exercises or to look up and share something relevant to an in-class discussion. Research shows that students who take notes via laptop do not retain information as well as those who take hand-written notes, and that using a laptop distracts not only you but those around you as well.

## Accomodations

Brown University is committed to full inclusion of all students. Please inform the instructor if you have a disability or other condition that might require accommodations or modification of any of

these course procedures. You may email the instructor, come to office hours, or speak with him after class, and your confidentiality is respected. We will do whatever we can to support accommodations recommended by SEAS. For more information contact Student and Employee Accessibility Services (SEAS) at 401-863-9588 or `SEAS@brown.edu`. Students in need of short-term academic advice or support can contact one of the deans in the Dean of the College office.

## Mental Health

Being a student can be very stressful. If you feel you are under too much pressure or there are psychological issues that are keeping you from performing well at Brown, we encourage you to contact Brown's Counseling and Psychological Services (CAPS). They provide confidential counseling and can provide notes supporting extensions on assignments for health reasons.

## Incomplete Policy

We expect everyone to complete the course on time. However, we certainly understand that there may be factors beyond your control, such as health problems and family crises, that prevent you from finishing the course on time. If you feel you cannot complete the course on time, please discuss with the instructor the possibility of being given a grade of Incomplete for the course and setting a schedule for completing the course in the upcoming year.

## Acknowledgments

Thanks to Tom Doeppner and Laura Dobler for the text on accommodation, mental health, and incomplete policy.