

# CSCI 6379

# Intro to Deep Learning

Dr. Dong-Chul Kim

# Welcome to CSCI 6379: Intro to Deep Learning

## **Class Schedule:**

Monday, 6:30 PM to 9:00 PM.

EIEAB 1.212

## **Class Format:**

Primarily in-person sessions for interactive learning experiences.

**Online Class Contingency:** Should the need arise for remote class, Zoom links will be provided via Blackboard announcements.

# Course Overview

**Discover Deep Learning:** An introductory course focusing on the fundamentals of deep learning, a key technology in modern artificial intelligence.

**Theory and Practice:** Learn essential concepts like neural networks, CNNs, RNNs, and reinforcement learning, balanced with practical applications.

**Hands-On Projects:** Apply your knowledge through projects using popular frameworks like PyTorch, tackling real-world data.

**Final Project:** Demonstrate your skills in a comprehensive capstone project, designing and presenting a deep learning model.

Suitable for beginners with a basic understanding of programming and mathematics, this course is a gateway to the rapidly evolving field of AI and deep learning.

# Instructor

Name: Dr. Dong-Chul Kim

Email: [dongchul.kim@utrgv.edu](mailto:dongchul.kim@utrgv.edu)

Office: EIEAB 3.244

Homepage: <https://faculty.utrgv.edu/dongchul.kim/>

Office hours: TBA

# Meet Your Instructor: Dr. Dong-Chul Kim

## Office Location & Availability:

- Office: EIEAB 3.244
- Office Hours: Monday and Wednesday, 11:00 AM - 12:00 PM (or longer as needed for problem-solving).
- Additional Meetings: Available by appointment for personalized assistance.

## Remote Office Hours:

- For virtual meetings, Zoom links will be provided on Blackboard.

## Contact Information:

- Email: [dongchul.kim@utrgv.edu](mailto:dongchul.kim@utrgv.edu)
- Learn more about Dr. Kim and access course materials on the [homepage](#).

# Your Teaching Assistant: Gaukhar Nurbek

## Availability and Contact:

- Office Hours: TBA
- For remote meetings, a Zoom link will be available on Blackboard.
- [gaukhar.nurbek01@utrgv.onmicrosoft.com](mailto:gaukhar.nurbek01@utrgv.onmicrosoft.com)

## Contact the TA:

- Other relevant information will be announced on Blackboard.

# Prerequisite

## **Programming Skills:**

Language: Python (all class assignments)

Note: Experience in languages such as C, C++, Matlab, or Javascript should aid in transition to Python

## **Mathematical Foundations:**

Calculus & Linear Algebra: Comfort with derivatives, matrix vector operations, and notation

Probability and Statistics: Understanding of probabilities, Gaussian distributions, mean, standard deviation, etc.

# Textbook

## No Required Textbook:

- Good news! There's no required textbook for this course.
- However, to support your learning, a list of recommended readings and resources will be provided. These materials will complement our lectures and lab sessions.

## Supplemental Learning Resources:

- Keep an eye on Blackboard for a curated list of supplementary materials including online tutorials, Python documentation, and relevant articles.



# Evaluations

- Lab: 25%
- HW: 25%
- Exam: 25%
- Project: 25%

# Course Guidelines and Expectations

1. **Syllabus Access:** Please download the syllabus from Blackboard for detailed course information.
2. **Operating System Flexibility:** You may use any operating system you prefer. I will primarily use Linux (Ubuntu) or MacOS.
3. **Open-Door Policy:** Feel free to approach me or the TA for assistance with any course-related queries.
4. **Academic Integrity:** Cheating is strictly prohibited. Maintaining academic honesty is crucial for upholding UTRGV's reputation and the value of your education.
5. **Communication:** Regularly check your UTRGV email and Blackboard for updates. Consider setting up email notifications on your phone for real-time alerts.

# Course Guidelines and Expectations

## 6. **Attendance and Participation:**

**For in-person classes:** Please be punctual and actively participate.

**For online classes:** Zoom links will be posted on Blackboard prior to class. Your camera should be on for attendance, and microphones muted unless speaking.

## 7. **Assignments:**

Start early and avoid late submissions. Late work may incur penalties.

Engage respectfully with classmates during group activities and discussions.

## 8. **Engagement:** Stay engaged and practice regularly. Classroom hours alone aren't sufficient for mastery—practice is key!

## 9. **Flexibility and Effort:** The course schedule may be flexible, so adaptability is important. Your best effort is essential for success in this course.

## 10. **Enjoy the Learning Experience:** Embrace the journey of learning AI!

# UTRGV Academic Calendar

[https://www.utrgv.edu/\\_files/documents/admissions/utrgv-academic-calendar.pdf](https://www.utrgv.edu/_files/documents/admissions/utrgv-academic-calendar.pdf)

# Coding Environments

Python

Pytorch

GPU

Google colab

Pycharm

Linux

GPU Cluster

SSH

venv

And so on

# Computing Resources



# Google Colab

## Pay As You Go

\$9.99 for 100 Compute Units

\$49.99 for 500 Compute Units

You currently have 106.63 compute units.

Compute units expire after 90 days.  
Purchase more as you need them.

- ✓ No subscription required.  
Only pay for what you use.
- ✓ Faster GPUs  
Upgrade to more powerful GPUs.

## Colab Pro

\$9.99 per month

Current plan

- ✓ 100 compute units per month  
Compute units expire after 90 days.  
Purchase more as you need them.
- ✓ Faster GPUs  
Upgrade to more powerful premium GPUs.
- ✓ More memory  
Access our higher memory machines.
- ✓ Terminal  
Ability to use a terminal with the connected VM.

## Colab Pro+

\$49.99 per month

- ✓ 500 compute units per month  
Compute units expire after 90 days.  
Purchase more as you need them.
- ✓ Faster GPUs  
Priority access to upgrade to more powerful premium GPUs.
- ✓ More memory  
Access our highest memory machines.
- ✓ Background execution  
With compute units, your actively running notebook will continue running for up to 24hrs, even if you close your browser.
- ✓ Terminal  
Ability to use a terminal with the connected VM.

# UTRGV GPU Cluster

[Click Here.](#)

Students will learn how to use in class.



# Team Project

Build a team of 1~3 students asap.

It's a great idea to invite classmates who haven't met before, come from different areas of study or expertise, and have different cultural backgrounds (if you can).

Look for team members who are kind and ready to put in effort as a team. It's also good if they're open to learning from one another.

# How to build a team

## **Method 1 - Share Your Idea:**

If you have a cool project idea, just send me an email with a short description of it as soon as you can. I'll then put it on the blackboard. That way, students who are interested in your project can get in touch with you.

## **Method 2 - Team Up with a Friend:**

If you're already planning to work with a friend, please give me the list of your team members.

## **Method 3 - Go Solo:**

If you want to work on your project alone, that's perfectly fine! Just let me know.

## **Method 4 - Easiest Option:**

If you don't submit your team member list by the deadline, don't worry. We'll place you in a team randomly.

# Rules in Dr. Kim's class

1. I may use either Linux (specifically Ubuntu) or MacOS, but I lean towards recommending Ubuntu. Nevertheless, you have the freedom to choose the operating system that suits you best.
2. Feel free to reach out if you encounter any difficulties or need assistance. Additionally, you can always seek help from the Teaching Assistant (TA). There are no foolish questions, so please don't hesitate to ask.
3. I kindly request that you refrain from any form of academic dishonesty or cheating. Keep in mind that your performance, even if your GPA at UTRGV is high, can potentially impact the institution's reputation. This could result in others overlooking the impressive GPAs of fellow UTRGV students.
4. It's essential to treat your peers with respect and make the most of your time here. Don't forget to regularly check your UTRGV email and Blackboard for updates. For real-time updates, consider setting up an email app on your smartphone.

# Rules in Dr. Kim's class

1. Punctuality is appreciated.
2. Start your group projects and homework assignments ahead of time, beginning today rather than procrastinating until tomorrow.
3. Kindly refrain from requesting late submissions at the end of the semester.
4. Let's aim to complete assignments promptly to maintain a positive atmosphere.
5. A grade of 89.9999 corresponds to a solid B; no curve will be applied.
6. Enjoy the process of learning about Deep Learning and conducting research.
7. Please be aware that, as a pilot course, the class schedule may be subject to changes if necessary.

# Rules in Dr. Kim's class (Online)

1. For our online class, a Zoom meeting link will become available on Blackboard 10 minutes prior to the scheduled class time.
2. During the online session, it would be greatly appreciated if you could enable your camera. It helps me connect with the class and is a courteous gesture towards your teacher. I will mark you as present when your camera is active.
3. Once the class officially starts, please ensure that your microphone is muted to minimize disruptions.
4. There may be a moment during the class when I take attendance.

# Rules in Dr. Kim's class (Online)

1. Let's make an effort to join the session on time.
2. Feel free to ask questions whenever you need clarification.
3. Remember to unmute yourself before posing a question.
4. Please avoid distractions such as playing games or watching YouTube, and stay focused on our class activities.
5. Let's maintain a respectful and considerate atmosphere in our interactions with each other.

# Make sure TA office hours and email

Please stop by the TA's office hours to say hi and tell them about yourself. If you're confused about something, feel free to ask the TA in the office hours or Discord. If the TA doesn't know the answer, they'll pass your question on to me.

Discord channel: TBA

# Lab 1: Meet your TA

Join the TA for an orientation session to kickstart your lab experience.

The orientation will be held online via Zoom during the TA's office hours.

**Schedule Announcement:** Keep an eye on Blackboard for the announcement of the specific date and time by the TA.

**Attendance:** Please note that your presence will be recorded by the TA during this session or submit a captured image on Blackboard.



# Research-Oriented Graduate Course

CSCI6379 Introduction to DL serves as a graduate-level course with a research focus.

The course aims to equip students with a solid understanding of DL algorithms and proficiency in their practical implementation.

Moreover, students will collaborate on a team project designed to emulate a research endeavor.

# Research-Oriented Graduate Course

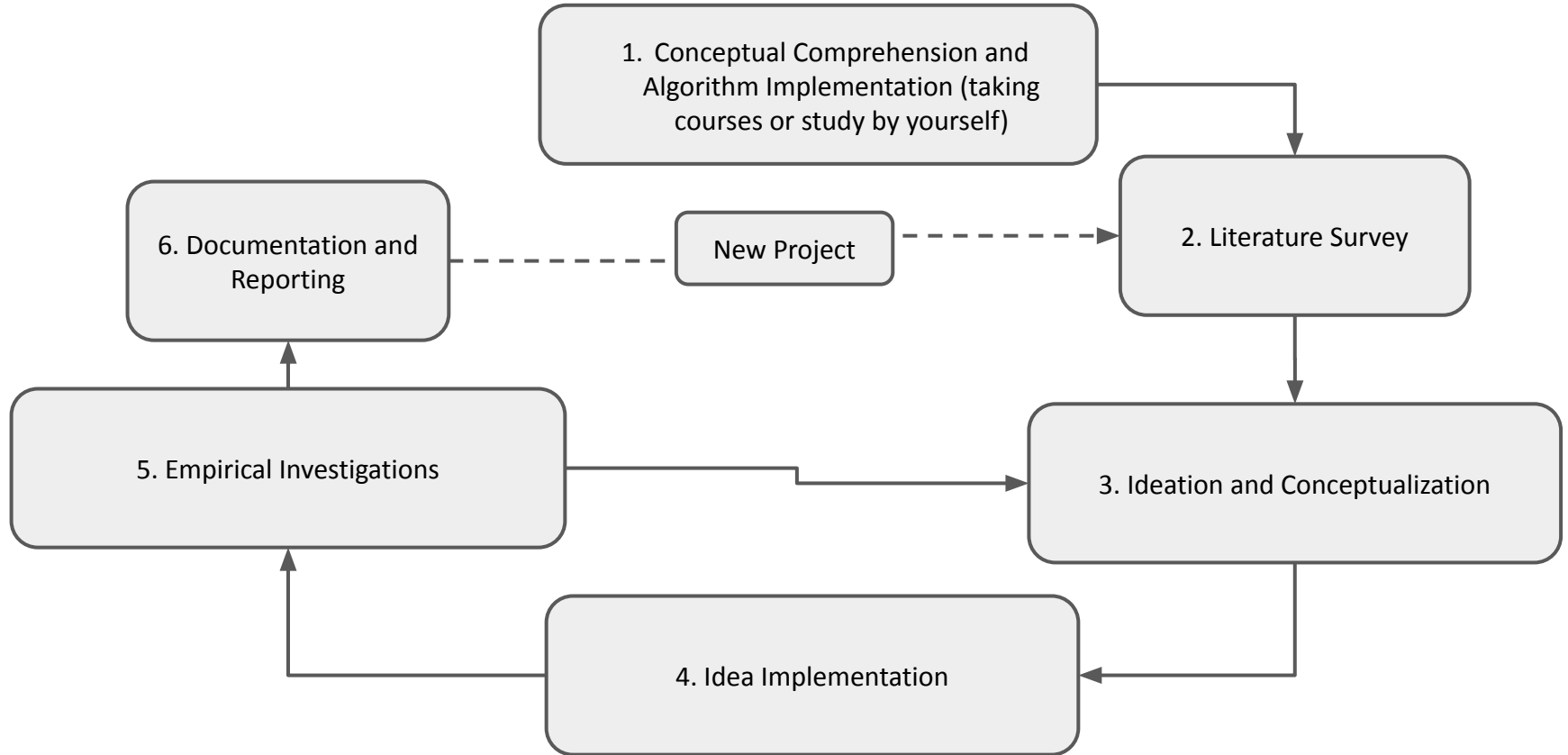
This project not only enhances students' practical skills but also guides them through the process of conducting research, starting from its inception and culminating in potential *publication*.

The term "publication" refers to the submission of research findings to a peer-reviewed conference. If the conference accept the submitted paper, the work will be featured in the conference proceedings, marking a significant achievement.

# Master thesis for AI research with Dr. Kim

1. Study or take DL course.
  - a. Concepts as well as implementation skills
2. Literature review
  - a. Study related works to define a research problem/goal.
  - b. During this step, you will study basic knowledge and skills for the target research.
  - c. We expect you to summarize papers and implement algorithms.
  - d. In reading and summarizing the papers, you will find a clue of your solution from the limitations of the papers.
  - e. Especially, the implementation will be good for you to prepare baseline algorithms in your actual experiments.
3. Proposal (before registering for Thesis I)
  - a. Introduction, related works, proposing idea, implementation and experiment plan, references using latex
4. Thesis I
  - a. Complete the method part (developing algorithm/solution/DL model) and initial experiment
5. Thesis II
  - a. Complete the experiments (performance evaluation/benchmarking) and prepare a manuscript in latex
  - b. Submit in a conference
  - c. Defense

# Research workflow



# Research Workflow

## **Conceptual Comprehension and Algorithm Implementation:**

Begin by acquiring a deep understanding of the relevant concepts and proficiently implementing the associated algorithms. This phase involves a combination of formal **courses** and **self-directed study**.

## **Literature Survey:**

Conduct an extensive **review of existing literature** in the field to identify key trends, advancements, and gaps in knowledge. This step is pivotal in establishing a strong foundation for your research.

## **Ideation and Conceptualization:**

Engage in creative **brainstorming** sessions to formulate your unique solution approach. This involves synthesizing insights from your literature review and combining them with your innovative ideas.

# Research Workflow

## **Empirical Investigations:**

Perform a series of **experiments** to validate the effectiveness and efficiency of your implemented solution. This includes rigorous benchmarking against established methods to objectively assess its performance.

## **Documentation and Reporting:**

Conclude the research workflow by compiling a comprehensive and coherent document as **research paper**.

Questions?

*Ok, let's get into Deep Learning!*