

Deep Learning for Computer Vision

Fall 2022

<https://cool.ntu.edu.tw/courses/189345> (NTU COOL)

<http://vllab.ee.ntu.edu.tw/dlcv.html> (Public website)

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Deep Learning for Computer Vision

- Time:
 - Tuesday 2, 3, 4
 - ~~09:10-12:20~~ → **09:30-12:20** with 1 break
- Location:
 - BL-112
- Websites:
 - NTU COOL; primary website: <https://cool.ntu.edu.tw/courses/8854>
 - Public use: <http://vllab.ee.ntu.edu.tw/dlcv.html>
 - Facebook for student discussions only (111-1 DLCV 課程交流版 (Fall 2022)):
<https://www.facebook.com/groups/820558985771977/>

Deep Learning for Computer Vision (cont'd)

- **Required** Knowledge & Skills
 - Knowledge of **linear algebra, vector calculus, and probability**
 - **Machine learning & deep learning** (this is **NOT** an entry-level course)
 - **Programming skills** (in Python)
- *If any of the above skills not available, please come back when ready.*
- This course is offered in **Mandarin** this semester.
Q&As & discussions can be done in any languages communicable.
- To encourage class attendance, lectures will be recorded but **NOT** uploaded to COOL until 2~3 weeks later (i.e., after HW due).

What to Expect from this Course?

- (Deep) Learning-Based Computer Vision
 - ~~Fundamentals of machine learning~~
 - **Deep learning** technologies for visual classification, synthesis, and beyond (e.g., multi-modal learning)
 - Different from the course of *Computer Vision* (more **image-processing** or **geometry-based computer vision**)
- Practical Experiences
 - Assignments and projects dealing with real-world visual data
 - Final projects possibly supported by industries with prizes
- Lots of work with fast pace, but hopefully helpful with lots of fun!



FUN!

Disclaimer

- Currently, you are responsible for **your own computing resources** (i.e., GPUs), which are absolutely required for your HWs & the final project.
- While doing my best to stick to what we announce, syllabus, course policy, or HW/project details might change over time. (DL/CV/AI are fast growing/changing research topics...)
- Yes, **up to 20% of students** chose to drop the course in previous years.
- And, yes, **we did fail students in the past years (~5% each semester)**.



Computing Resources (TBD)

➤ **Not** offered (as of Sept 28th)

➤ However, you do need them for your HWs/final projects.

	authentication	free quota	comment
Azure (Microsoft Azure)	✓ student ID ✓ credit card	+ USD \$ 100 + USD \$ 200	1*K80 = USD \$ 0.9 / hour
GCP (Google Cloud Platform)	✓ credit card	USD \$300 / 3 months	
AWS (Amazon Web Service)	✓ credit card	-	1 GPU = about US\$ 571.01 / year
Colab (Google Colaboratory)	✓ no limit ✓ credit card	666	

Course Information

- Teaching Team & Office Hours
- Course Policy
- How to enroll in this class if not already in?

About Myself

- **Education**



- **Ph.D./M.S. in Electrical & Computer Engineering** 2002 – 2009
Carnegie Mellon University, Pittsburgh, USA



- **B.S. in Electrical Engineering** 1997 – 2001
National Taiwan University, Taipei, Taiwan

- **Experiences**



- **NVIDIA** AI研究總監, NVIDIA Research 2022/08 – present



- **Professor**, Dept. EE, National Taiwan University
- **Principal AI Consultant**, Inventec 2021 – 2022

AICS



- **AI Advisory Consultant**, ASUS Intel. Cloud Services (AICS) 2019 – 2022
- **Associate Professor**, National Taiwan Univ. 2017 – 2019



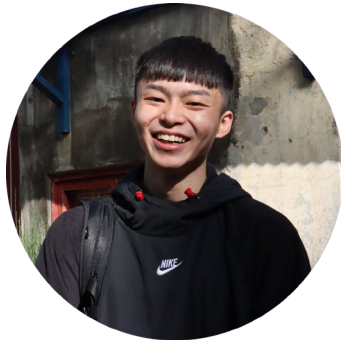
- **Deputy Director**, CITI, Academia Sinica 2015 – 2017
- **Associate/Assistant Research Fellow** 2009 – 2017

Research Center for IT Innovation (CITI), Academia Sinica

- **Office Hour**

- After class, or by appointment via email (ycwang@ntu.edu.tw)

TAs & Office Hours:



陳宇軒 (Yu-Hsuan Chen)

MK-514

TA Hours: Mon. 12:20 - 13:10



許元譯 (Yuan-Yi Hsu)

MK-514

TA Hours: Mon. 12:20 - 13:10



黃繼綸 (Gi-Luen Huang)

BL-530

TA Hours: Wed. 12:20 - 13:10



周子庭 (Zi-Ting Chou)

MK-514

TA Hours: Thu. 16:30 - 17:20



張凱博 (Kai-Po Chang)

MK-514

TA Hours: Thu. 14:20 - 15:10



劉亦傑 (I-Jieh Liu)

MK-514

TA Hours: Thu. 16:30 - 17:20

TAs & Office Hours:



黃啟斌 (Chi-Pin Huang)

MK-514

TA Hours: Thu. 14:20 - 15:10



陳志臻 (Jr-Jen Chen)

MK-514

TA Hours: Tue. 12:20 - 13:10



潘阜承 (Fu-Cheng Pan)

MK-514

TA Hours: Fri. 12:20 - 13:10



廖宇謙 (Yu-Chien Liao)

MK-514

TA Hours: Fri. 12:20 - 13:10



曾揚哲 (Yang-Che Tseng)

MK-514

TA Hours: Tue. 12:20 - 13:10

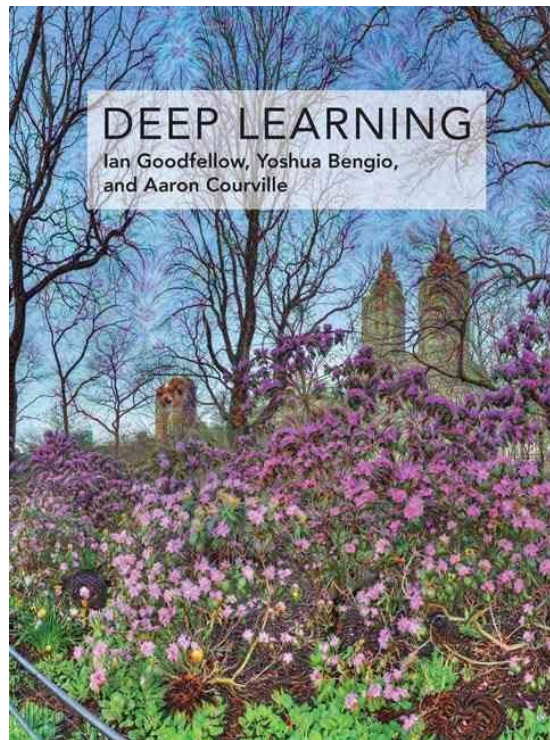
If any questions, you should ask at NTU COOL (anonymous is fine)
or contact your TA **by email at** ntudlcv@gmail.com (not via *private message*).
You are welcome to discuss with your classmates at the **Facebook Page**.

Tight (yet tentative) Schedule

Week	Date	Topic	Remarks
1	9/6	Course logistics & registration; Machine Learning 101	
2	9/13	Introduction to Convolutional Neural Networks (I)	
3	9/20	Introduction to Convolutional Neural Networks (II) Tutorials on Python, Github, etc. (by TAs)	HW #1 out
4	9/27	Object Detection & Segmentation; Generative Model	
5	10/4	Generative Adversarial Networks, and Diffusion Model	HW #1 due
6	10/11	Transfer Learning for Visual Classification & Synthesis	HW #2 out
7	10/18	Guest Lecture	ICIP week
8	10/25	Recurrent Neural Networks	HW #2 due
9	11/1	Transformer; Vision & Language (I)	HW #3 out
10	11/8	Vision & Language (II); Few-Shot Learning (I)	CVPR due
11	11/15	N/A	HW #3 due; No class (校慶)
12	11/22	Few-Shot Learning (II); Self-Supervised Learning	HW #4 out
13	11/29	Guest Lecture (?)	NeurIPS week (?)
14	12/6	3D Vision	
15	12/13	Federated Learning	HW #4 due
17	12/30	Presentation for Final Projects	

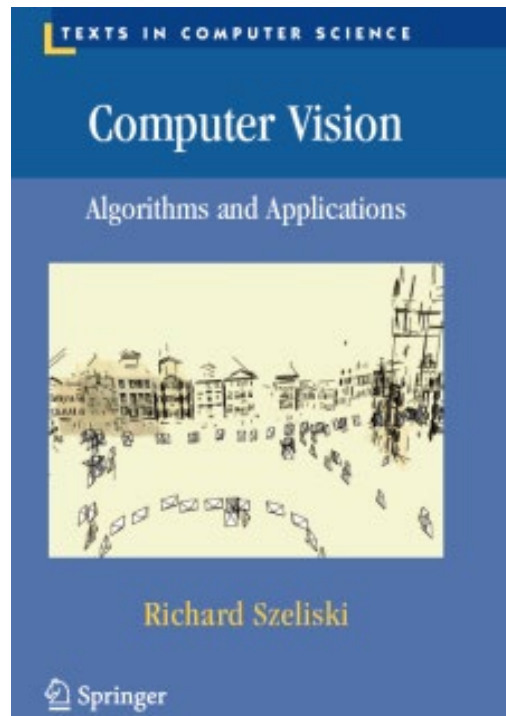
Textbook (Optional)

- Deep Learning, MIT Press
 - Ian Goodfellow, Yoshua Bengio, and Aaron Courville
 - Free online versions available at www.deeplearningbook.org

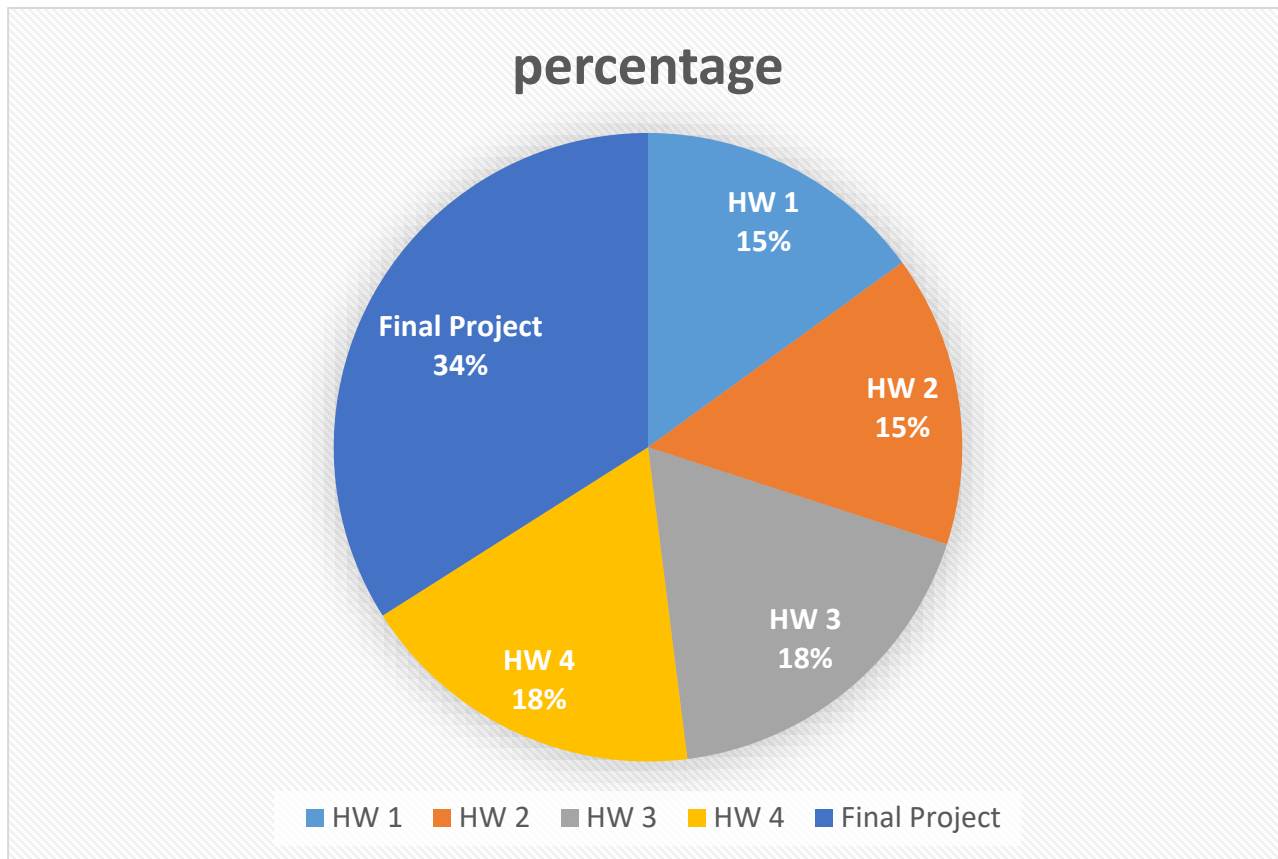


Textbook (Optional)

- Computer Vision: Algorithms and Applications, Springer
 - Richard Szeliski
 - Free online versions available at <http://szeliski.org/Book/>



About Grading



Bonus points possibly available for (1) HWs & (2) lecture interaction

About Grading (cont'd)

- HW assignments **(66%)**
 - ~~HW 0 (non-DL HW, 0% but required)~~
 - HWs #1~4 (15~18% each with possible bonus points)
 - ~~HW #5 (optional yet with bonus points)~~
- Final project + poster presentation + code, etc. **(34%)**
- **Bonus points**
 - Course participation (e.g., interaction, Q&A, etc.)
 - Extra challenges in HWs
 - Excellent performance for final project (e.g., competitions, publication submissions, etc.)
- *Cash Prize (optional)*
 - Selected final projects might be sponsored by industries.
 - Details to be announced.



Final Grade

Letter Grading System	Definition	Grade Points	Conversion Scale
A+	All goals achieved beyond expectation	4.3	90-100
A	All goals achieved	4.0	85-89
A-	All goals achieved, but need some polish	3.7	80-84
B+	Some goals well achieved	3.3	77-79
B	Some goals adequately achieved	3.0	73-76
B- (passing grade for graduate students)	Some goals achieved with minor flaws	2.7	70-72
C+	Minimum goals achieved	2.3	67-69
C	Minimum goals achieved with minor flaws	2.0	63-66
C- (passing grade for undergraduate students)	Minimum goals achieved with major flaws	1.7	60-62
F	Minimum goals not achieved	0	59 and below
X	Not graded due to unexcused absences or other reasons	0	0
W	Withdrawal		
NG	No grade reported		
IP	In progress		
TR	Transfer credit		
EX	Exempted		

About Course HWs/Projects

- About HW late policy
 - We offer free late days (up to THREE days) in case you have dates, midterms, HW dues for other course, etc. (如期中考、專題、社團、約會、找不到人抄)
 - 1 min ~ 23 hr 59 min all count as ONE late day.
 - After HW due day, a penalty of **30%** per day.
 - We'll maximize your final score based on HW scores and the late days used.
 - **No** late submission for the final project, obviously.

About Course HWs/Projects



- About Final Project
 - Details to be announced around mid semester.
 - 3~4 people per group
 - Expect project proposal/progress/final report (for top 3 teams) + poster & oral presentation (on 2022/12/30 Fri)
 - Selected topics possibly come with cash prizes.
 - Evaluated by instructor, TAs, and possibly guest judges
 - (Intra/inter-group) peer evaluation will be conducted.
 - Snack/drinks will be provided during final presentation.



Academic Integrity

- Can discuss HW with peers, but DO NOT copy and/or share code
 - Plagiarism is against university policy.
 - Violation in ANY form for HWs & final project would result in F.
 - Seriously, we gave at least five Fs in previous semesters for the above cases.
- Do not directly use code/results from Internet unless you have permissions.
 - If not sure, ask!
 - If so, do specify in your HW/project.
- You **CANNOT** use your published work as your final project.
 - However, you are encouraged to extend your previous work.
 - Also, you are encouraged to turn your high-quality projects into publications.

DOs and DONTs for the TAs (& Instructor)

- Do NOT send **private** messages to the TAs via Facebook, etc.
 - TAs are here to help, but they are not your tutors 24/7.
- TAs will **NOT** debug for you, including coding, environmental, library dependency problems.
- If you cannot make the TA hours, please email & schedule an appointment instead of stopping by the lab directly.
- Btw, TAs do **NOT** answer questions not related to the course...



How to Sign Up If Not Already In?

- **Capacity**

- Classroom capacity: 147; currently registered: 90
- About **60** students can be additionally added.

- **Priority**

- EECS > Engr. with related backgrounds/needs > Sci. > others
- Based on seniority, backgrounds, programming skills, etc.
- If you are still interested in this course and plan to enroll, please fill in the following form **Sept 6th Tue between 9am-5pm:**
<https://forms.gle/Z8sZsYbpwvHrpqDv5>
- We will announce the enrollment results via email no later than **Sept 12th Mon 5pm**. All decisions are final.



Any Questions?

Course registration at <https://forms.gle/Z8sZsYbpwvHrpqDv5> by 9/6 Tue 5pm!