Extended Syllabus

(2024 Fall)

Course Title	Deep Learning	Course Number	CSE/AIE4014
Credit	3	Enrollment Eligibility	Junior, Senior
Class Time	Tue/Thurs, 10:30-11:45	Classroom	K303

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Ⅰ. Course Overview

1. Description

We will study various deep learning techniques, covering areas like linear regression, classification, segmentation, detection, and more. In addition to these fundamentals, we'll analyze influential research papers such as ResNet, Vision Transformer, Batch Normalization, among others. This course aims to provide you with a solid groundwork for exploring advanced topics in deep learning, including computer vision and natural language processing.

2. Prerequisites

Minimum: Calculus, Python
Preferred: Calculus, Python, Linear Algebra, Probability, Statistics

3. Course Format (%)

Lecture	Discussion	Experiment/Practicum	Field study	Presentations	Other
100 %	%	%	%	0 %	%

4. Evaluation (%)

mid-term Exam	Final exam	Quizzes	Presentations	Projects	Assignments	Participation	Other
40 %	40 %	%	%	%	20 %	%	%

Ⅱ. Course Objectives

- Understanding four basic deep learning topics.
- Understanding basic mathematics for comprehensive understanding of machine learning topics.

Ⅲ. Course Format

(* In detail)

Modality:
In-person.

Language:
The lecture will be given in English.

Ⅳ. Course Requirements and Grading Criteria

Midterm : 40%
Final : 40%
Assignments : 20%

This course will have zero tolerance with any cheating activities. All source codes submitted will be copy-checked.

Ⅴ. Course Policies

Attendance and Work: All students should attend class unless discussed with the instructor.

Honor code: Students are encouraged to discuss assignments with other students or professor. However, plagiarism and exam cheating are unacceptable in any academic environment. If your assignment or exam is identified as plagiarism, it will get 0 point.

Ⅵ. Materials and References

Textbook.
Lecture slides for the Deep Learning course at the University of Tuebingen (available through CyberCampus)

References.
Kevin P. Murphy, Probabilistic machine learning: an introduction. MIT press, 2022.
Ian Goodfellow, Yoshua Bengio, and Aaron Courville. Deep Learning. MIT Press, 2016.
Christopher M. Bishop, and Nasser M. Nasrabadi. *Pattern recognition and machine learning*. Springer, 2006.\

Ⅶ. Course Schedule (Subject to change)

Week 1	**Learning Objectives**	OT / Introduction to Deep Learning
	Topics	OT / Introduction to Deep Learning
	Class Work (Methods)	Lecture

	Materials (Required Readings)	PPT
	Assignments	None
Week 2	Learning Objectives	Introduction to Deep Learning / Computation Graphs
	Topics	Introduction to Deep Learning / Computation Graphs
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	Assignment 1
Week 3	Learning Objectives	Deep Neural Networks
	Topics	Deep Neural Networks
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 4	Learning Objectives	Deep Neural Networks / Regularization
	Topics	Deep Neural Networks / Regularization
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 5	Learning Objectives	Regularization / Optimization
	Topics	Regularization / Optimization
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT

	Assignments	Assignment 2
Week 6	**Learning Objectives**	Optimization
	Topics	Optimization
	Class Work (Methods)	Lecture/Presentation
	Materials (Required Readings)	PPT
	Assignments	
Week 7	**Learning Objectives**	Research at VRL / Course Summary
	Topics	Research at VRL / Course Summary
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 8	**Learning Objectives**	Midterm Exam
	Topics	
	Class Work (Methods)	
	Materials (Required Readings)	
	Assignments	
Week 9	**Learning Objectives**	Convolutional Neural Networks
	Topics	Convolutional Neural Networks
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT

	Assignments	Assignment 3
Week 10	**Learning Objectives**	Sequence Models
	Topics	Sequence Models
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 11	**Learning Objectives**	Natural Language Processing
	Topics	Natural Language Processing
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 12	**Learning Objectives**	Autoencoders
	Topics	Autoencoders
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 13	**Learning Objectives**	Generative Adversarial Networks
	Topics	Generative Adversarial Networks
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT

	Assignments	Assignment 4
Week 14	**Learning Objectives**	Invited Talk / Course Summary
	Topics	Invited Talk / Course Summary
	Class Work (Methods)	Lecture
	Materials (Required Readings)	PPT
	Assignments	
Week 15	**Learning Objectives**	No classes (lecturer on business travel).
	Topics	N/A
	Class Work (Methods)	N/A
	Materials (Required Readings)	N/A
	Assignments	
Week 16	**Learning Objectives**	Final project
	Topics	
	Class Work (Methods)	
	Materials (Required Readings)	
	Assignments	

Ⅷ. Aid for the Challenged Students

Challenged students are encouraged to make an individual meeting at the beginning of the semester with the instructor to request any help during the course.