Artificial Intelligence

Algorithms and Applications with Python

Exam Preparation

TECHNISCHE UNIVERSITÄT DARMSTADT

WIRTSCHAFTS INFORMATIK

AIAA 1 + 2

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</> course material: ↗ https://github.com/dominikjung42 | syllabus: ↗ www.is.tu-darmstadt.de

Agenda

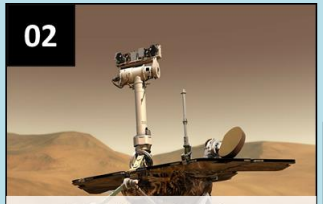
5.1 Exam Organisation and Preparation

5.2 Questions and Restrictions

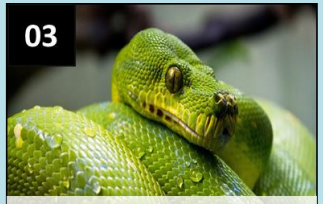
5.3 Course Evaluation and Discussion

Course Overview

Introduction into Artificial Intelligence



Problem-Solving Agents



Introduction into AI-Programming with Python

Data and Feature Engineering

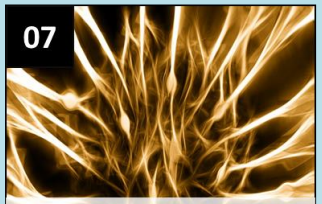
Knowledge Reasoning: Fundamental Algorithms and Concepts

Machine Learnin:g Fundamental Algorithms and Concepts

Workbook Exercises

Code Lectorial
Python

Workbook & Coding Exercises



Artifical Neural Networks and Deep Learning

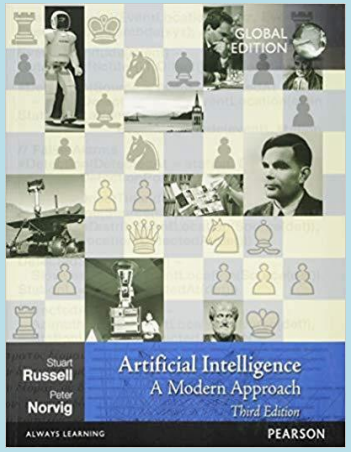
Probabilistic Reasoning and Modelling: Fundamental Algorithms and Concepts

Language and Image Processing: Fundamental Algorithms and Concepts

Building Productive AI-based Information Systems

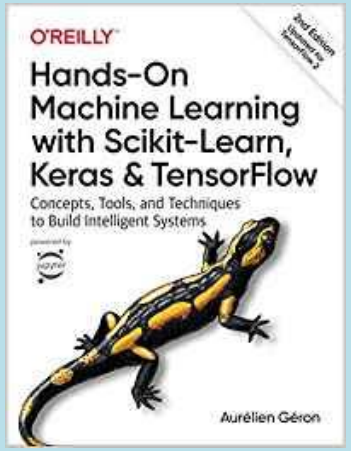
Workbook & Coding Exercises

Literature Recommendations



Rusell, S., & Norvig, P. (2016). *Artificial Intelligence: A Modern Approach.* Global Edition.

▶ Availability: ↗University Library Darmstadt | ↗Amazon



Géron, A. (2017). *Hands-on machine learning with Scikit-Learn and TensorFlow: Concepts, tools, and techniques to build intelligent systems.*

▶ Availability: ↗University Library Darmstadt | ↗Amazon

Previous Exams are Online Available

EXAM

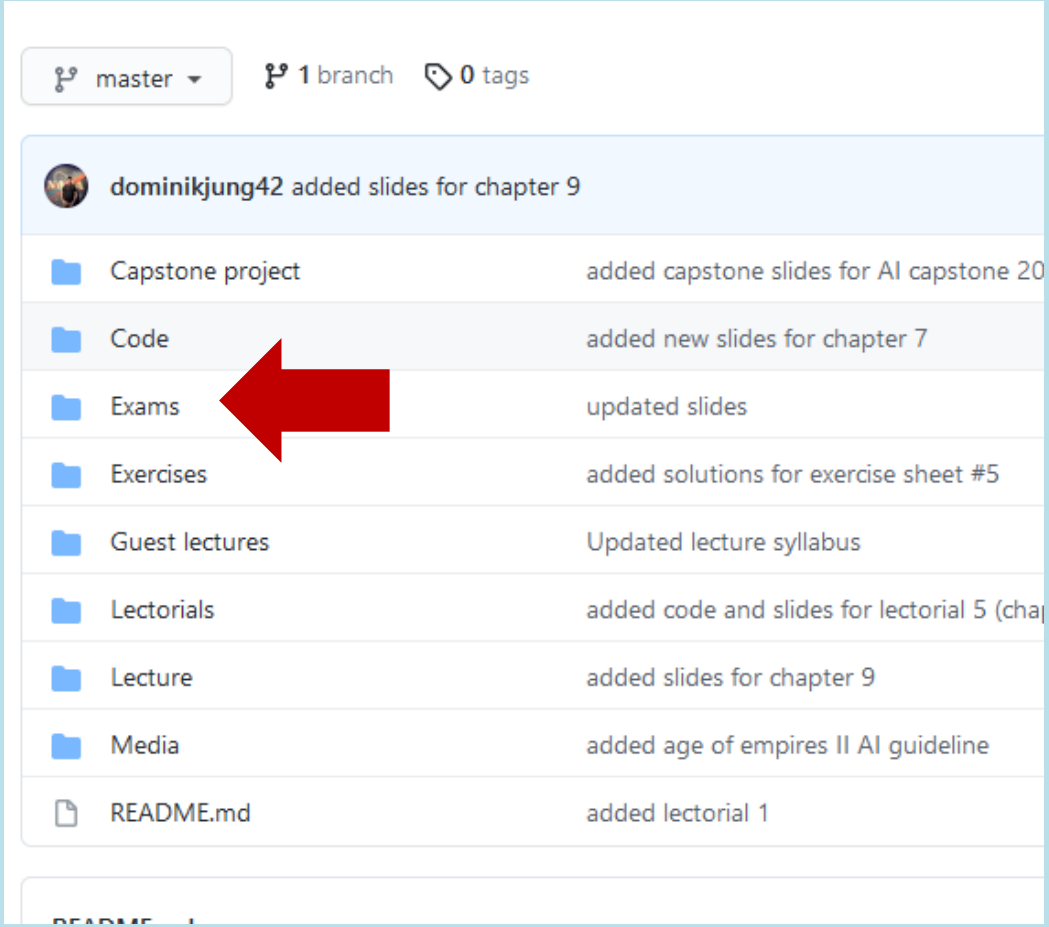
Course: Artificial Intelligence – Algorithms and Applications with Python

Date: *2021*

Name: _____

Matr.-Nr.: _____

Section	1	2	3	Σ
Points				



Closed Book and Closed Notes Exam (preliminary!)

33 %

BASIC CONCEPTS AND THEORETICAL BACKGROUND

- You will have to answer multiple questions related to basic concepts of the lecture or give basic definitions or formulas.
- Aka “knowledge questions”.

33 %

APPLYING THEORY TO PRACTICE

- You will have to show that you understand the algorithms and concepts and that you can use them to solve a (business/real-life) problem.
- For this kind of task you might need your calculator or geometrical triangle, pen and eraser.

34 %

PROGRAMMING

- You will have to write, read and understand code examples in the context of artificial intelligence problems (search, machine learning, etc.).
- Use the exercises, lectorials and the code examples to prepare!

Note: It may be possible that the point distribution differs in the final exam

Example: Basic Concepts and Theoretical Background

1. Many people have tried to define the concept "*Artificial intelligence (AI)*". The most popular one in AI is the definition from McCarthy. Please give his definition of *Artificial Intelligence* we have discussed in lecture. (1 P)

Example: Application of Theoretical Concepts

1. Describe the following problem using a Markov chain. In particular, determine the state space, transition matrix, and transition graph of the Markov chain. Explain

Example: Programming

1. Please give python code to start and initialize the perceptron with the dataset start_weights? (1 P)

How to start

- Start to recapitulate the storyline of the lecture. Read the related chapters of the literature if you feel unsecure or repeat the video recordings of the lecture
- Answer all the classroom tasks, discuss the results with your learning group
- Take a deeper dive at the coding exercises. Solve the coding exercises of each chapter
- Solve the previous exams that are online available!

Which Content is Relevant for the Exam?

Outline

2 Artificial Intelligence and Information Systems

- 2.1 Artificial Intelligence Project Management
- 2.2 Artificial Intelligence Project Lifecycle
- 2.3 Skills and Roles in Artificial Intelligence Projects
- 2.4 Types of Artificial Intelligence based Information Systems

▶ **What we will learn:**

- How typical AI projects are implemented, and how their life cycle and phases look like
- What skills are needed to implement an AI project
- Why the industry needs AI specialists, and how typical AI jobs look like
- Which types of AI based information systems exists and how they can be used to solve real-world problems

Image source: ↗ Pixabay (2019) / ↗ CC0

▶ **Duration:**

- 120 min

▶ **Relevant for Exam:**

- 2.1-2.4

Artifical Intelligence: Building AI-Based Information Systems with Python - Dr. Dominik Jung

Note: There might still be questions where you might need a basic understanding of the content of the excluded chapters

Always exam relevant

- **Lecture** slides, **lectorials** and **exercises** (*except excluded chapters on the overview*)
- **Referenced chapters** of **the course books** and **all literature downloads** available in GIT (*look at the folder "literature"*)
- The **handouts** for the business cases and the **discussion results**
- **Every teaching material** accompanying this lecture (**code examples**, guest lectures etc.)

Overview Relevant Chapters

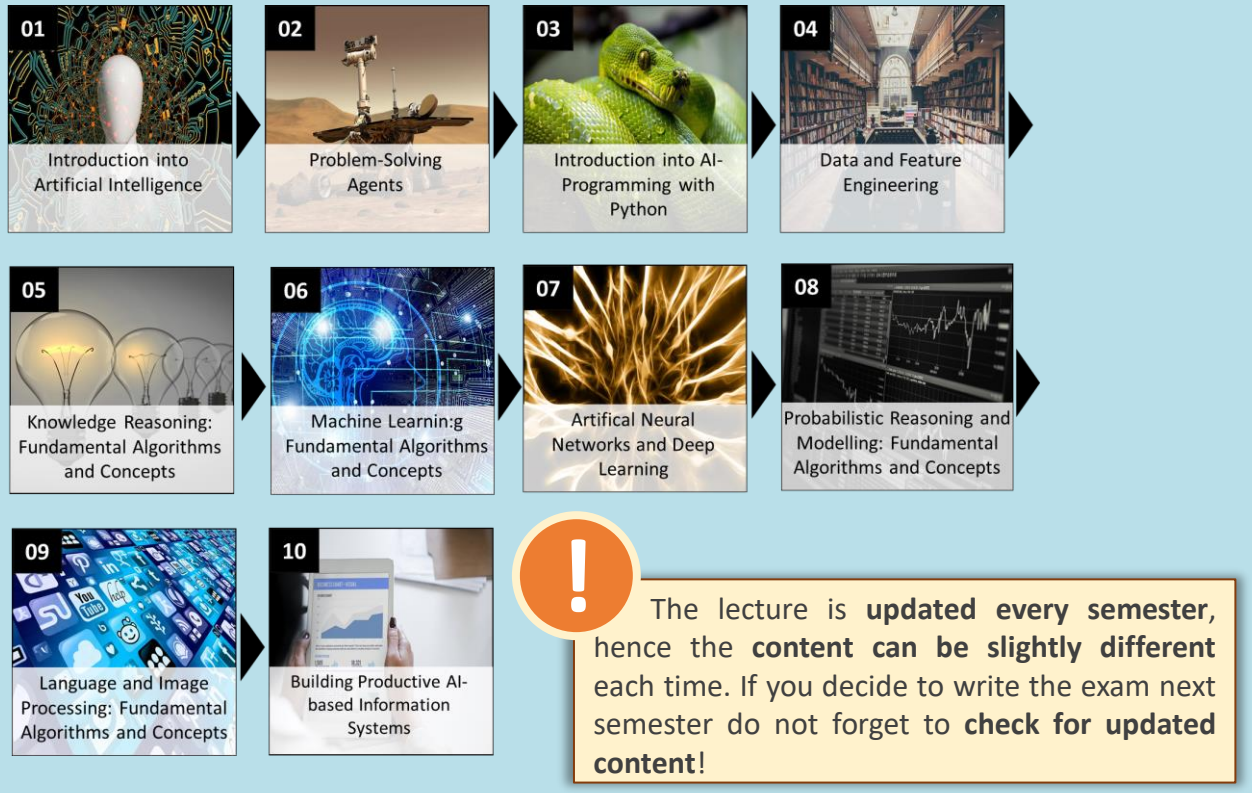
Regularly relevant chapters for the exam

Semester 1

1.1	2.1	3.1	4.1	5.1	6.1	Lectorial 1
1.2	2.2	3.2	4.2	5.2	6.2	Lectorial 2
1.3	2.3	3.3	4.3	~~5.3~~	6.3	Lectorial 3
~~1.4~~	~~2.4~~		4.4	~~5.4~~	6.4	Lectorial 4
	~~2.5~~		4.5	~~5.5~~	~~6.5~~	
					~~6.6~~	Exercises

Semester 2

7.1	8.1	9.1	10.1	Lectorial 5	Capstone
7.2	8.2	~~9.2~~	10.2	~~Lectorial 6~~	Case challenge
7.3	8.3	~~9.3~~	10.3	~~Lectorial 7~~	Guest lecture
7.4	8.4	9.4	~~10.4~~		
	~~8.5~~		~~10.5~~	Exercises	



The lecture is **updated every semester**, hence the **content can be slightly different** each time. If you decide to write the exam next semester do not forget to **check for updated content**!

For once, the following subchapters are not tested explicitly for the **written** exam for **this** semester:

8.1-8.4, 9.1-9.4, Lectorial 4, Lectorial 5

Questions