Artificial Intelligence

Algorithms and Applications with Python

Exam Preparation

AIAA 1 + 2

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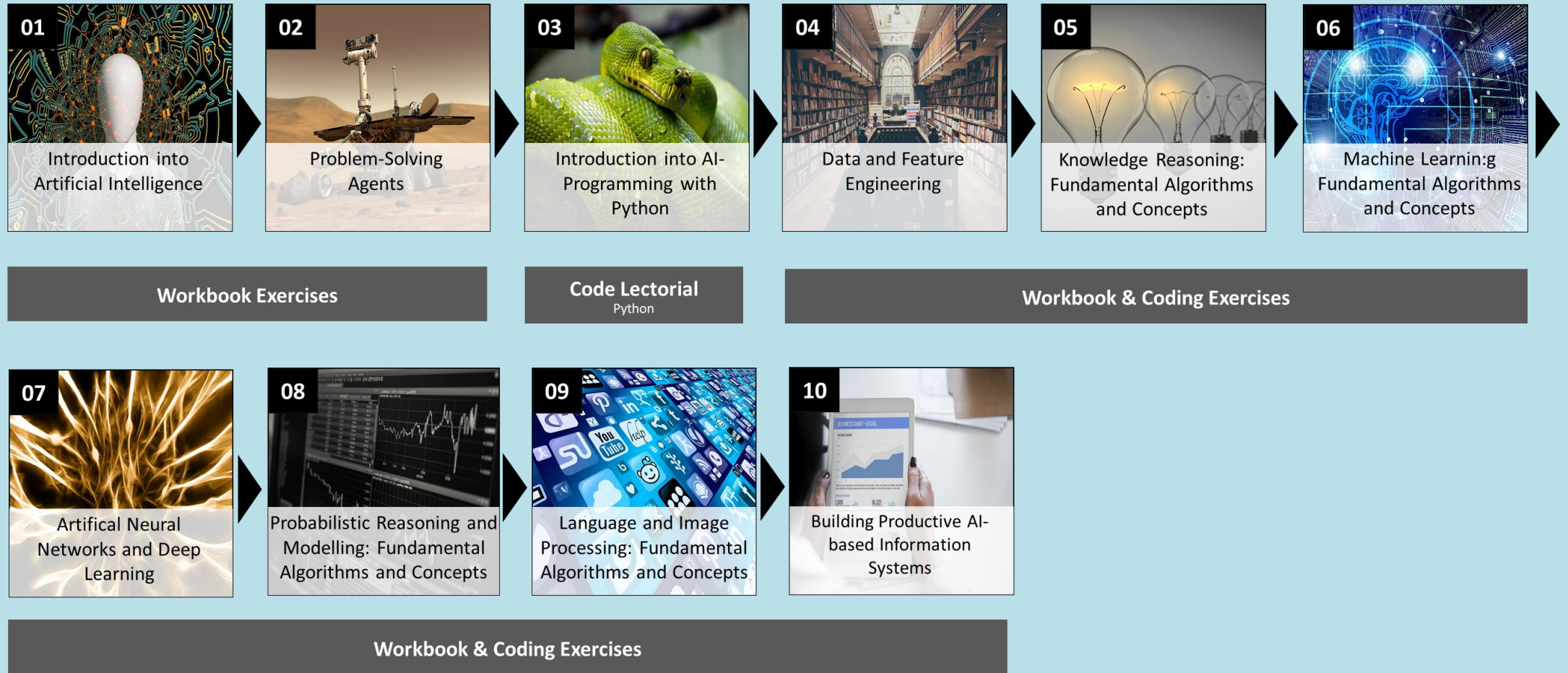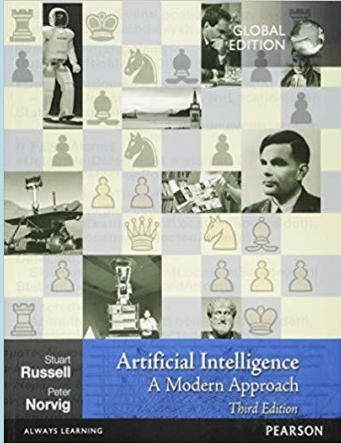# Agenda

5.1 Exam Organisation and Preparation

5.2 Questions and Restrictions

5.3 Course Evaluation and Discussion

Course Overview

01 Introduction into Artificial Intelligence

02 Problem-Solving Agents

03 Introduction into AI-Programming with Python

04 Data and Feature Engineering

05 Knowledge Reasoning: Fundamental Algorithms and Concepts

06 Machine Learnin:g Fundamental Algorithms and Concepts

Workbook Exercises

Code Lectorial Python

Workbook & Coding Exercises

07 Artifical Neural Networks and Deep Learning

08 Probabilistic Reasoning and Modelling: Fundamental Algorithms and Concepts

09 Language and Image Processing: Fundamental Algorithms and Concepts

10 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
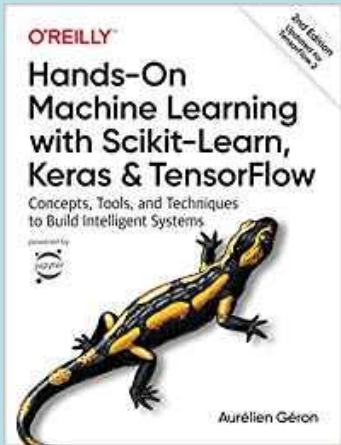
Géron, A. (2017). *Hands-on machine learning with Scikit-Learn and TensorFlow: Concepts, tools, and techniques to build intelligent systems.*

▸ Availability: ↗University Library Darmstadt | ↗Amazon

Previous Exams are Online Available

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)

- 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.)

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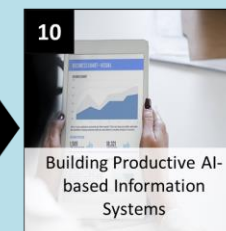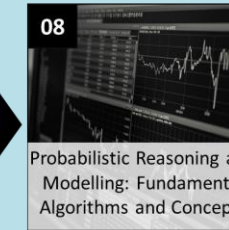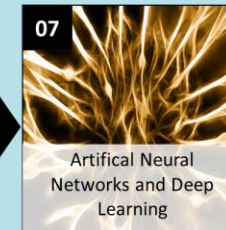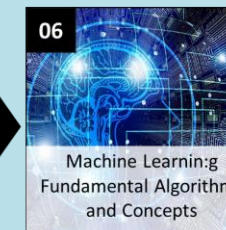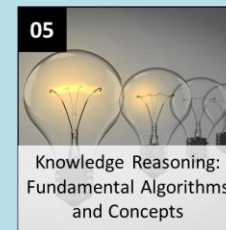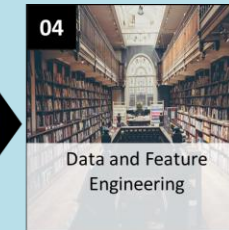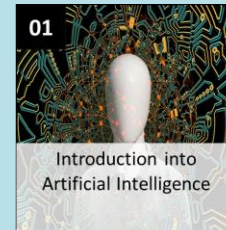
> **!** The lecture is **updated every semester**, hence the **content can be slightly different** each time. If you decide to write the exam next semester do not forget to **check for updated content**!

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

5.2 + 6.3 + 6.4

Questions