

Study material for the course

## E016350B - Artificial Intelligence (2024-2025)

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The lecture **slides** and **exercises** cover all the material that will be tested in the exam. For some parts comprehensive **lecture notes** and/or tutorials in the form of Jupyter notebooks (IPYNB) are available as well. These are meant to facilitate studying and deeper understanding of the material presented in the theory slides. Labs, homework and project enable better understanding of the studied theory and its practical application. Optional material includes video recordings from previous years. The suggested reference material provides wider context and deeper insight. The materials presented under advanced topics are *not* tested in the exam.

E016350B (3 credits)	Lectures (slides)	Lecture Notes/Tutorials	Exercise	Video	Lab	Ref. material	E016350A (6 credits)
	1 Introduction					[R&N], Ch.1	
	2 Supervised learning	Supervised learning	☒			[R&N], Ch.19	
	3 Logistic Regression	Logistic regression • Nonlinear features • Multiclass classification	☒		Lab1	[R&N], Ch.19	
	4 Decision trees	Decision trees; ensemble learning	☒		Lab2	[R&N], Ch.19	
	5 Neural networks Part1		☒		Lab3	[R&N], Ch.21	
	6 Neural networks Part2				HW1 <b>P1</b>	[R&N], Ch.21	
	7 White-box vs. black-box ML		☒			[R&N], Ch.19	
	8 Unsupervised learning	IPYNB Tutorials: Clustering; PCA; Kmeans&GMM				[R&N], Ch.20	
	9 Probabilistic reasoning		☒	☒		[R&N], Ch.12	
	10 Bayesian networks		☒	☒		[R&N], Ch.13	
	11 Inference in Bayes' nets		☒	☒		[R&N], Ch.13	
	12 Bayesian machine learning	Learning probabilist. models	☒			[Ng&Ma], Ch.10, Ch.12	
	13 Advanced topics (basics of MCMC)						
	14 Intelligent agents Search strategies		☒	☒	Lab4 HW2	[R&N], Ch.2 [R&N], Ch.3	
	15 Game playing		☒	☒		[R&N], Ch.5	
	16 Reasoning over time		☒	☒		[R&N], Ch.14	
	17 Rational decisions		☒	☒		[R&N], Ch.16	
	18 Markov decision processes		☒	☒		[R&N], Ch.17	
	19 Reinforcement learning		☒	☒	<b>P2</b>	[R&N], Ch.22	
	20 Advanced topics						

Table 1: Overview of the study material. HW denotes homework assignment and **P** projects.

### References

[R&N] S. Russel and P. Norvig, *Artificial Intelligence: A Modern Approach*, (Fourth Edition), Prentice Hall, 2021.

[Ng&Ma] Andrew Ng and Tengyu Ma: *Lecture Notes Machine Learning CS229*, 2023.

[https://cs229.stanford.edu/main\\_notes.pdf](https://cs229.stanford.edu/main_notes.pdf)