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Fakultät Informatik und Wirtschaftsinformatik

Technische Hochschule Würzburg-Schweinfurt

Modulhandbuch

Master Artificial Intelligence (M. Sc.)

Sommersemester 2025
Wintersemester 2025

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Inhalt

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

1. Semester

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171527
Adventure Capitalism: how to build a tech startup?

Modulprofil

Prüfungsnummer
5171527

Dauer
1 Semester

Häufigkeit des Angebots
Unregelmäßig

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Gruppenarbeit

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Ivan Yamshchikov

Dozierende
Prof. Dr. Ivan Yamshchikov

Verwendbarkeit MAI, MDB, MIS

Studiensemester 1. und 2. Semester

Art des Moduls FWPM

Verpflichtende Voraussetzungen gemäß SPO
none

Empfohlene Voraussetzungen
none

Inhalte
The course is structured as a series of shark-tank events with founders, investors and developers that estimate current progress of the team and decide if the team can work further on the current project or has to pivot.

As the course progress we cover following topics:

1 What is venture capital?
— a brief history of venture investment
— probabilistic approach to venture investment
— venture capital as innovation driver
— Pareto-principals
2 What is a product?
— Why is technology not a product?
— Paper prototyping and product market fit
— Customer development cycle
— Product-market fit
— Minimal Viable Prototype
— Price and value: elasticity, supply, demand, branding
3 What is a pitch deck?
— What are the key structural components of a good pitch?
— Principles of storytelling
— Unique selling proposition
4 How to manage people?
— Managing small teams
— Trade-off between discipline and creativity
— Motivation, empathy and discipline
5 What is your go-to-market strategy?
— Customer acquisition costs
— Lifetime value
— Distribution channels and partnerships
— Data-driven marketing

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
— Students the core principles of technological entrepreneurship and build a technologic business from scratch
— Students create and validate a customer development pipeline
— Students evaluate product market fit and unit economics of the technological product
— Students create a pitch deck for their project from scratch, evaluate the quality of the early-stage venture capital, and know how to implement a fund-raising plan
— Students create a Minimal Viable Prototype (MVP) by applying principles of paper prototyping and using frameworks for customer development
— Students understand the overall properties of venture capital markets and pitch their project to actual VCs.

Literatur
I. Strebulaev, A. Dang "Venture Mindset"
B. Horowitz "The Hard Thing About Hard Things: Building a Business When There Are No Easy Answers"
P. Thiel "Zero to One: Notes on Startups, or How to Build the Future"
M. Weber "Protestant Ethic and the Spirit of Capitalism"
K.F. Lee "AI Superpowers: China, Silicon Valley and the New Word Order"
B. Christian, T. Griffiths "Algorithms to Live By"

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171524
Applied Computer Vision: From Research to Real-World Implementation

Modulprofil

Prüfungsnummer
5171524

Dauer
1 Semester

Häufigkeit des Angebots
Unregelmäßig

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminar

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Dominik Seuß

Dozierende
Prof. Dr. Dominik Seuß

Verwendbarkeit	MAI
Studiensemester	1. Semester
Art des Moduls	FWPM

Verpflichtende Voraussetzungen gemäß SPO
none

Empfohlene Voraussetzungen
none

Inhalte
This seminar provides students with a comprehensive introduction to the field of Computer Vision, encompassing both traditional approaches and modern Deep Learning-based methods. Emphasis is placed on understanding the unique strengths and limitations of each approach, highlighting scenarios where traditional techniques remain highly effective and relevant despite the advancements in Deep Learning.

The course is designed to be highly practical and industry-oriented, focusing on current challenges and real-world applications in Computer Vision. Students will explore state-of-the-art methods used to tackle practical problems, with a balance of theoretical insights and hands-on implementation.

Throughout the seminar, theoretical foundations are complemented by practical exercises and coding assignments, allowing students to directly apply their knowledge. Participants will not only learn to understand cutting-edge algorithms but also implement and adapt them to solve specific problems. This hands-on approach strengthens both technical expertise and problem-solving skills, preparing students for real-world scenarios in academic or industrial settings.

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Subject Knowledge:

- Acquire fundamental and advanced knowledge in Computer Vision, including both traditional approaches and modern Deep Learning methods
- Understand the strengths and limitations of traditional and modern techniques in different application contexts
- Be able to analyze, compare, and evaluate current Computer Vision methods

Practical Implementation Skills:

- Develop/Adapt and implement solutions to real-world industry problems
- Apply theoretical concepts to practical tasks through programming exercises and projects
- Adapt existing Computer Vision algorithms and apply them to concrete scenarios

Problem-Solving Abilities:

- Analyze complex challenges in Computer Vision and develop appropriate solutions
- Transfer in-depth theoretical concepts to practical applications and develop pragmatic solutions

Linking Theory and Practice:

- Understand the connection between research approaches and their real-world applicability
- Be able to integrate and utilize both theoretical models and practical implementations of algorithms

Literatur
Literature will be provided separately for each topic

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171020
Artificial Intelligence and Machine Learning

Modulprofil

Prüfungsnummer
5171020

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Sommersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Andreas Lehrmann

Dozierende
Prof. Dr. Andreas Lehrmann

Verwendbarkeit	MAI
Studiensemester	1. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
Basic knowledge in programming (Python) and mathematics (linear algebra, calculus).

Inhalte
This course provides a comprehensive introduction to the field of machine learning. Starting from basic principles, we are going to develop a data-driven framework that allows us to express representation and prediction tasks as learning problems, either supervised or unsupervised.

In both cases, our discussion of the relationship between data and model will lead to a broad spectrum of approaches with different properties: linear vs. non-linear, parametric vs. non-parametric, deterministic vs. non-deterministic, and classification vs. regression. We are going to explore how these models are formulated, how they can be optimized, and how they can be applied to new data.

In a parallel track, we are going to explore theoretical properties of machine learning models, including their robustness, complexity, and meta-level behaviour.

In particular, the course covers the following topics:

- Data: collection & representation
- Data: statistical & visual exploration
- (Linear/Probabilistic/Non-parametric) classification
- (Linear/Non-Linear/Robust) regression
- Meta learning: ensembling & boosting
- Clustering
- Outlier Detection
- (Stochastic) gradient descent
- (Feature/Model) selection
- Regularization
- Convolutions
- Kernel Trick
- Maximum likelihood & maximum a-posteriori
- Principal component analysis
- Gaussian processes
- Multi-dimensional scaling
- Neural networks & deep learning

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Schriftliche Prüfung (sP) gemäß § 23 APO

Dauer/Form der Prüfung
90 Minuten

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Upon completion of this module the students have a broad understanding of machine learning and its subfields, including the following:

- They can independently collect/analyze data and take the necessary steps to prepare them for learning and inference tasks.
- They are familiar with a variety of supervised/unsupervised models and understand their principles and properties.
- They can select an appropriate model for a given task and design, implement, optimize, run, and analyze the corresponding machine learning pipeline.
- They understand the balance between expressiveness and generalization. They are able to employ selection, regularization, and meta-learning techniques to

maximize model performance.

Literatur
1. Bishop, Christopher M.: Pattern Recognition and Machine Learning. Springer, 2006.
2. Murphy, Kevin P.: Probabilistic Machine Learning: An Introduction. The MIT Press, 2022.
3. Hastie, Trevor and Tibshirani, Robert and Friedman, Jerome: The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer, 2009.

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171528
Autonomous Systems

Modulprofil

Prüfungsnummer
5171528

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Wintersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminar

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Arndt Balzer

Dozierende
Prof. Dr. Arndt Balzer,
Prof. Dr. Andreas Lehrmann

Verwendbarkeit	MAI, MDB
Studiensemester	1. und 2. Semester
Art des Moduls	FWPM

Verpflichtende Voraussetzungen gemäß SPO
keine

Empfohlene Voraussetzungen
Affinität zu technischen Anwendungen

Inhalte
Die Inhalte der Lehrveranstaltung werden aktuellen Erfordernissen angepasst.

Seit 2020 ist der Schwerpunkt die Entwicklung von Software für ein autonom fahrendes Fahrzeug auf Basis von NVIDIA Hardware
Grundlagen des maschinellen Lernen, dabei u.a. künstliche neuronale Netze
Maschinelles Sehen, "klassische" Bildverarbeitung

Bis 2019 war der Schwerpunkt: Entwicklung von Software zur Steuerung eines Quadrokopters
Programmierung von Embedded Systems
Regelungstechnik, insbesondere PID Regler
Sensorik, Telemetrie
Mathematische Grundlagen: Kartesische und Polar Koordinaten, Euler Winkel, komplexe Zahlen, Quaterionen, Vektoralgebra
Signalverarbeitung: Zustandsschätzer, Bayes-, Gauss-, Kalman-Filter
Lageregelung, Yaw Regelung, Telekommandos

Bei Bedarf: Entwicklung von Software für MCU mit aktuellen IDEs, teil-autonomes Fahren

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Referat, Kolloquium

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Die Studierenden sind in der Lage

- Notwendigkeit, Marktrelevanz und das Potential Eingebetteter (mobiler) Systeme zu bewerten,
- Herausforderungen bei Bau autonomen fahrender Systeme beurteilen und Lösung entwerfen zu können,
- Aufbau und Funktionsweise der Hard- und Software von Regelungssystemen am Beispiel eines Quadrokopters zu beschreiben, einschließlich der Echtzeitanforderungen,
- Teile der Systemsoftware zu implementieren,
- eingesetzte mathematische Methoden zu beurteilen,
- Ansätze zur Verbesserung der Signalverarbeitung zu entwerfen.

Literatur
Tom M. Mitchell, Machine Learning, http://www.cs.cmu.edu/~tom/mlbook.html
Christopher M. Bishop, Pattern Recognition and Machine Learning, online
Trevor Hastie et al., The Elements of Statistical Learning, online
Kevin P. Murphy, Machine learning, online
S. Thrun, W. Burgard, D. Fox: Probabilistic Robotics, The MIT Press, 2005

Unterlagen der Uni Würzburg / Emqopter, 2019
A. Gelb, Applied Optimal Estimation, MIT Press, 1974
R. Kalman, A New Approach to Linear Filtering and Prediction Problems, Transaction of the ASME—Journal of Basic Engineering, 1960
P. Marwedel: Embedded System Design - Foundations of Cyber-Physical Systems, Springer, 2011
D. Gajski, F. Vahid: Specification and Design if Embedded Systems, Pearson, 2008
J. McClellan. R. Schafer: Signal Processing First, Pearson, 2003

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171514
Entrepreneurship for Engineers

Modulprofil

Prüfungsnummer
5171514

Dauer
1 Semester

Häufigkeit des Angebots
Unregelmäßig

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Gruppenarbeit

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Ivan Yamshchikov

Dozierende
Prof. Dr. Ivan Yamshchikov

Verwendbarkeit	MAI, MDB
Studiensemester	1. und 2. Semester
Art des Moduls	FWPM

Verpflichtende Voraussetzungen gemäß SPO
none

Empfohlene Voraussetzungen
none

Inhalte
The course is structured as a series of shark-tank events with founders, investors and developers that estimate current progress of the team and decide if the team can work further on the current project or has to pivot.

As the course progress we cover following topics:

1 What is venture capital?
— a brief history of venture investment
— probabilistic approach to venture investment
— venture capital and technological development
2 What is a product?
— Why is technology not a product?
— Paper prototyping and product market fit
— Customer development for engineers
3 What is a pitch deck?
— What are the key structural components of a good pitch?
— Unit economics
— Storytelling for engineers
4 How do you make decisions under stress?
— Managing small teams
— Trade-off between discipline and creativity
— Empathy for engineers
5 What is unit economics?
— Customer acquisition costs
— Lifetime value

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
— Students learn how to apply the principles of technological entrepreneurship.
— Students can create a Minimal Viable Prototype (MVP) by applying principles of paper prototyping.
— Students can create and implement a customer development pipeline can evaluate product market fit and unit economics of the technological product.
— Students can create a pitch deck for their project from scratch, evaluate the quality of the early-stage venture capital, and implement a fund-raising plan.
— Students understand the overall properties of venture capital markets.

Literatur
I. Strebulaev, A. Dang "Venture Mindset"
B. Horowitz "The Hard Thing About Hard Things: Building a Business When There Are No Easy Answers"
P. Thiel "Zero to One: Notes on Startups, or How to Build the Future"
M. Weber "Protestant Ethic and the Spirit of Capitalism"
K.F. Lee "AI Superpowers: China, Silicon Valley and the New Word Order"
B. Christian, T. Griffiths "Algorithms to Live By"

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5173030
Introduction to Deep Learning

Modulprofil

Prüfungsnummer
5173030

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Sommersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Magda Gregorová

Dozierende
Prof. Dr. Magda Gregorová

Verwendbarkeit	MAI
Studiensemester	1. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
None

Inhalte
- Artificial neural networks (ANN) in machine learning (ML)
- Basic concepts of learning algorithms and typical tasks
- Model development workflow, hyperparameter tunning, performance measures and model selection
- Ethical and societal aspects (open access, data governance, fairness, transparency, reproducibility, safety and robustness, interpretability and human oversight/trust, ecological footprint)
- Basic ANN architectures
- Multilayer perceptron (feed forward)
- Convolutional neural networks
- Recurrent neural networks
- ANN model regularization
- Norm penalties
- Data augmentation
- Early stopping
- Dropout
- ANN model optimization
- (Stochastic) gradient descent
- Backpropagation
- Momentum methods
- Learning rate scheduling
- Major ANN applications and selected advanced models
- Computer vision (object detection, image classification, style transfer)
- Natural language processing (word2vec, BERT)
- Autoencoders
- Generative models
- Deep learning software packages (one of these)
- PyTorch
- Tensorflow

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Upon completion of the module students:

- can place artificial neural networks within the broader area of machine learning, understand their major advantages and disadvantages, and are aware of major applications of ANN as well as selected advanced models under research and their fundamental ideas
- understand and assess the critical differences between the basic ANN architectures (MLP, CNN, RNN), can implement them in standard deep learning software packages, and can train, test, and evaluate the ANN models over real data
- building on the experience of working with their own ANN implementations, can reuse publicly available implementations of more complex models to carry out experiments over real datasets, can compare the

performance of these across various models and their hyperparameter setups

- understand the importance of transparency and reproducibility in deep learning experimentation and can present in written as well as oral their learning and evaluation pipeline including relevant description of the selected software and hardware configuration
- are aware of the ethical and societal impacts of machine learning and deep learning and can critically assess deep learning reports along these lines

Literatur
1. Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep Learning. MIT Press, 2016
2. Zhang, Aston, Zachary C. Lipton, Mu Li, and Alexander J. Smola. Dive into Deep Learning. https://d2l.ai/, 2021

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5172010
Mathematical Foundations of AI

Modulprofil

Prüfungsnummer
5172010

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Sommersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Martin Storath

Dozierende
Prof. Dr. Martin Storath

Verwendbarkeit	MAI
Studiensemester	1. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
None

Inhalte
1. Advanced Vector Calculus
- Multivariate derivatives and chain rule
- Backpropagation and automatic differentiation
- Linearization and multivariate Taylor series

2. Advanced Linear Algebra
- Eigenvalues and eigenvectors
- Singular value decomposition
- Matrix approximation

3. Continuous Optimization
- Gradient descent
- Constrained optimization and Lagrange multipliers
- Convex Optimization

4. Models and Data
- Change of variables
- Empirical risk minimization
- Parameter estimation
- Probabilistic modelling and inference
- Model selection

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Schriftliche Prüfung (sP) gemäß § 23 APO

Dauer/Form der Prüfung
90 Minuten

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse

- Students refresh and develop further their knowledge and skills on the necessary mathematical foundations for understanding and developing algorithms for AI; in particular, linear algebra, calculus, probability.
- Students understand the principles of continuous optimization (constrained and unconstrained), are able to select appropriate approaches and they apply them for problems in AI.
- Students are able to apply and evaluate the principles of probabilistic modelling and inference, and they create probabilistic models for frequently occurring kinds of data.
- Students use the acquired mathematical skills to design and create frequently occurring building blocks of AI systems, such as linear regression, PCA, Gaussian mixture models and support vector machines.

Literatur

1. M. P. Deisenroth, A. A. Faisal, Cheng Soon Ong: Mathematics for Machine Learning, Cambridge University Press, 2020
2. C. M. Bishop: Pattern Recognition and Machine Learning, Springer, 2006
3. G. James, D. Witten, T. Hastie, R. Tibshirani: An Introduction to Statistical Learning, Second Edition, Springer, 2021

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171040
Reasoning and Decision Making under Uncertainty

Modulprofil

Prüfungsnummer
5171040

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Sommersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Frank Deinzer

Dozierende
Prof. Dr. Frank Deinzer

Verwendbarkeit	MAI
Studiensemester	1. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
none

Empfohlene Voraussetzungen
none

Inhalte
The course is composed of 2 thematic blocks.

Block A: Reinformcement Learning
1. Basic Reinforcement Learning Concepts
- Actions and States
- Goals, Rewards, Returns and Episodes
- Policies and Value Functions

2. Basic Reinforcement Learning Methods
- Finite Markov Decision Processes
- Dynamic Programming
- Monte Carlo Methods

3. Advanced tabular learning Methods
- Temporal-Difference Learning
- Bootstrapping Methods

4. Learning in Continuous State and Action Spaces
- On-Policy Approximation
- Value-function Approximation
- Off-Policy Approximation
- Approximate Eligibility Traces

5. Value Function Approximation Case Studies
- Computer Vision: Action planning
- Mastering Games: Backgammon, Go

6. Applications and Exercises

Block B: Sensor Fusion
1. Using Bayes for Sensor Data Fusion
- Modeling and Estimation of Densities
- Sensor Fusion over Time

2. Hidden Markov Models and Viterbi Algorithm
3. Recursive State Estimation
- Gaussian Filters
- Nonparametric Filters

4. Applications

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse

- Students develop further knowledge and skills on the necessary mathematical foundations for understanding and developing algorithms for AI.
- Students can apply the principles of Reinforcement Learning algorithms
- Students can use the principles of modelling gents, environments and rewards.
- Students understand the necessity of function approximations in learning.
- Students understand the concepts of statiscal sensor fusion
- Students can realize sensor fusion applications
- Students build on their acquired knowledge to master learning problems.

Literatur

1. Sutton, Barto. Reinforcement Learning - An Introduction. Bradford Books, 2018
2. Thorp. Beat the Dealer. Random House. 1966
3. Mitchell. Data Fusion: Concepts and Ideas. Springer. 2014
4. Thrun, Burgard, Fox: Probabilistic Robotics. MIT Press. 2005
5. Johnson, Freund, Miller. Miller & Freund's Probability and Statistics for Engineers. Pearson

Further specialized literature will be announced in the course.

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171110
Scientific seminar

Modulprofil

Prüfungsnummer
5171110

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Sommersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminar

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Magda Gregorová

Dozierende
Prof. Dr. Magda Gregorová,
Dr. Maryam Bagheri

Verwendbarkeit MAI

Studiensemester 1. Semester

Art des Moduls Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
None

Inhalte
Practical research and scientific work skills and principles of good scientific conduct.

- Academic writing on AI topics in English (for non-native speakers)
- Standard structure of academic texts – theses, technical reports, research articles, academic CV
- Specific grammar features and word choices of English academic text and common pitfalls for non-native speakers
- Good conduct in academic writing (citations, acknowledgments, plagiarism), open science, transparency, reproducibility
- Literature review (dblp, google scholar, journals and conferences, predatory publishers)
- Visual support of technical text (visual display of quantitative data, visual communication), academic presentations and poster design
- Analysis of academic text, critical evaluation, peerreview process and principles
- Academic and research support software tools and bibliography systems (Zotero, Mendeley, …)
- Academic talk structure, audience targeting, academic exchange of knowledge and experience, constructive feedback and academic research discussion

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Upon completion of the seminar students:

- can write English academic texts on AI topics taking into account the expected format (using appropriate mathematical typographical software - LaTex), structure, and the target audience; can adapt the language and visual support accordingly (article vs. presentation, etc.).
- understand the importance of good academic conduct, the boundaries and consequences of plagiarism, and the benefits of open science, transparency and reproducibility, they can design their communication strategy accordingly (open access / open source, experimental documentation, etc.)
- can conduct relevant literature search, analyze the quality of texts, can create and maintain a relevant bibliography in standard software tools and correctly reference previous work in their academic outputs
- are aware of selected recent trends in AI research and main opportunities and challenges in transferring them to practical applications
- can critically analyse academic text and provide constructive feedback, can interact with senior researchers in an informed discussion

Literatur
To be defined in seminar

2. Semester

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: unbekannt
Advanced Information Modelling

Modulprofil

Prüfungsnummer
unbekannt

Dauer
1 Semester

Häufigkeit des Angebots
Unregelmäßig

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminar, Projekt

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Dr. h. c. Robert Grebner

Dozierende
Prof. Dr. Dr. h. c. Robert Grebner

Verwendbarkeit	MAI
Studiensemester	2. Semester
Art des Moduls	FWPM

Verpflichtende Voraussetzungen gemäß SPO
none

Empfohlene Voraussetzungen
none

Inhalte
Human intelligence manifests itself through a number of highly specialized but interrelated competences and skills. Assuming that the basis for these abilities is an extraordinary well-organized associative memory, information and knowledge modeling takes on a special position for Artificial General Intelligence (AGI).

A lot of commercial software systems use basic information modeling techniques, like Entity Relationship Diagrams (ERD) or Uniform Modelling Language (UML), which has strengths but also weaknesses. Some techniques are designed to model more dynamical events like the Business Process Modelling Language (BPML). Further develop modeling techniques are used to describe information in a more sophisticated way and even used to model knowledge represented in computer systems and AI systems. One example is the Knowledge Modeling and Description Language (KMDL).

This course provides three main topics:
a) The phenomenon of data, information and knowledge and advanced approaches to structure information for intelligent systems.
b) The modeling of different aspects like time and space within that information models in different ways.
c) Development of a custom modeling language providing an orthogonal integration of the discussed aspects.
d) Implementing of parsers to compile the languages into adequate information and knowledge structures.

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Mündliche Prüfung

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Understanding common information modeling languages. Apply that languages for special situations. Analyse the structure of modeling lanugages regarding the value for intelligent systems. Create a individual information and knowledge modeling language. Create a parser for that language.

Literatur
Bagui, Sikha; Earp, Richard; Database Design Using Entity-Relationship Diagrams (Foundation of Database Design); Auerbach Publications; 2011
Booch, Grady; Rumbaugh, James; Jacobson, Ivar; The Unified Modeling Language User Guide; Addison-Wesley Professional; 2017
OMG et al.; OMG Meta Object Facility (MOF) Core Specification, Version 2.5.1; 2019; https://www.omg.org/spec/MOF/2.5.1/PDF
OMG et al.; OMG Unified Modeling Language (OMG UML), Version 2.5.1; 2017; https://www.omg.org/spec/UML/2.5.1/PDF
OMG et al.; Business Process Model and Notation (BPMN), Version 2.0.2; 2014; https://www.omg.org/spec/BPMN/2.0.2/PDF
ISO/IEC; Information technology — Syntactic metalanguage — Extended BNF; 1996; 2023 last review; https://www.iso.org/standard/26153.html

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5173100
Computer Vision

Modulprofil

Prüfungsnummer
5173100

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Wintersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Dominik Seuß

Dozierende
Prof. Dr. Dominik Seuß

Verwendbarkeit	MAI
Studiensemester	2. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
None

Inhalte
This lecture course provides a foundational and comprehensive introduction to the field of Computer Vision, covering both traditional image processing techniques and modern Deep Learning-based approaches. The focus is on understanding the theoretical principles underlying key algorithms, while also examining their applicability to real-world problems.
Students will explore the strengths, limitations, and use cases of classical methods—such as edge detection, feature extraction, and image segmentation—as well as state-of-the-art machine learning techniques, including Convolutional Neural Networks (CNNs) and other deep learning architectures.
A strong emphasis is placed on bridging theory and practice. Real-world examples are drawn from domains such as medical image analysis, industrial inspection, and other safety-critical applications, where factors like robustness and explainability play a central role. Concepts from Explainable AI (XAI) are discussed in the context of interpreting and validating model behavior, particularly in high-stakes environments.
Theoretical knowledge is reinforced through practical exercises and programming assignments, enabling students to implement core algorithms and develop their own solutions to defined tasks. This integrated approach supports the development of both analytical thinking and technical proficiency.

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
None

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
None

Lernergebnisse
By the end of this course, the students will be able to:

- Remember fundamental principles and key terminology related to traditional and deep learning-based Computer Vision methods.
- Understand the theoretical foundations and practical implications of major Computer Vision algorithms in various application contexts.
- Apply established Computer Vision techniques to solve basic real-world problems through programming assignments and projects.
- Analyze the strengths, limitations, and suitability of traditional versus deep learning approaches across diverse tasks.
- Evaluate and compare different Computer Vision models based on performance, computational efficiency, and application constraints.
- Create adapted or novel solutions by integrating existing algorithms into practical systems tailored to specific use cases.
- Apply research-informed methodologies to bridge the gap between theoretical models and industry-level implementations.

Literatur

- Szeliski, R. (2022). Computer vision: Algorithms and applications (2nd ed.). Springer.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning. MIT Press.
- Chollet, F. (2021). Deep learning with Python (2nd ed.). Manning.
- Zhang, A., Lipton, Z. C., Li, M., & Smola, A. J. (2023). Dive into deep learning (2nd ed.). Retrieved from https://d2l.ai
- Khan, S., Rahmani, H., Shah, S. A. A., & Bennamoun, M. (2018). A guide to convolutional neural networks for computer vision. IEEE Transactions on Systems, Man, and Cybernetics: Systems, 49(1), 1–20. https://doi.org/10.1109/TSMC.2018.2882141

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5172080
Fundamentals of Mobile Robotics

Modulprofil

Prüfungsnummer
5172080

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Wintersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr.-Ing. Pascal Meißner

Dozierende
Prof. Dr.-Ing. Pascal Meißner

Verwendbarkeit	MAI
Studiensemester	2. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
None

Inhalte
01. Introduction – Nomenclature, history, state of the art, module logistics
02. Linear Algebra and Probability Primer – Vectors and operations, matrices and operations, axioms of probability, independent events, Bayes rule
03. Bayes Filter – Recursive Bayesian updating, state transitions, Markov property, derivation
04. Probabilistic Modelling – Odometry- and velocity-based motion models, beam- and scan- based sensor models
05. Localization with Nonparametric Filters – Discrete Bayes filter, importance sampling, particle filter
06. Localization with Gaussian Filters – Kalman filter, Extended Kalman filter
07. Mapping with Known Poses – Occupancy maps, reflection probability maps
08. Landmark-based SLAM – SLAM problem, EKF SLAM, loop closing, Rao-Blackwellization, FastSLAM
09. Grid-based SLAM – Scan matching, FastSLAM, improved proposals, selective resampling
10. Motion and Path Planning – Configuration spaces, combinatorial planning, search algorithms, A* with extensions, collision avoidance
11. Markov Decision Processes – MDP definition, utility, value iteration, policy iteration

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Mündliche Prüfung

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse

- Apply the Bayes (filter) formula and sample from probability density functions
- Determine and apply probabilistic sensor and motion models
- Discuss the steps and components of realizations of Bayes filters
- Implement realizations of Bayes filters and compute location estimates for robots
- Build and analyze grid maps
- Differentiate between localization and SLAM systems as well as outline auxiliary techniques for SLAM solutions
- Assess and implement components of landmark- and grid-based solutions to the SLAM problem
- Differentiate between different path planning techniques and discuss the steps of collision avoidance solutions
- Apply and implement graph-search techniques for path planning
- Assess the Markov Decision Process definition as well as the concepts of Utility and Policy
- Apply dynamic programming on Markov Decision Problems to compute value functions and optimal policies

Literatur

- Probabilistic Robotics, Sebastian Thrun and Wolfram Burgard and Dieter Fox, MIT Press, 978-0262201629, 2005
- Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, 4th ed. Prentice Hall, 978-0136042594, 2021

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: unbekannt
Introduction to the Ethics and Regulation of AI

Modulprofil

Prüfungsnummer
unbekannt

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Wintersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Markus Oermann

Dozierende
Prof. Dr. Markus Oermann

Verwendbarkeit	MAI
Studiensemester	2. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
None

Inhalte
The module introduces core ethical theories and explores key AI-related ethical challenges, such as agency, bias, data protection, democracy, job transformation, and sustainability. It examines methods and standards for integrating ethical assessment into AI development, referencing major international guidelines (EU, OECD, UNESCO, Council of Europe, G7) and the new EU AI Act. Current legal debates are covered, including copyright in training data, for AI-generated content, and evolving EU liability frameworks for AI.

Overview on the content of the module:
- Ethics 101 and the traditional schools of Ethics
- Clusters of ethical challenges related to AI:

- agency and human/machine relation
- power and responsibility
- biases and discrimination
- data ownership/data protection (including basics structures of data protection law)
- democracy, election integrity, free discourse and the problem of AI driven malinformation, disinformation and deep fakes
- AI as catalyst of radical transformation?: job displacement/ transformation of work
- AI and sustainability

- Approaches and standards on how to integrate ethical assessment in professional workstreams/development of AI and AI applications
- Selected established international ethical guidelines and their take on these challenges: EU, OECD, UNESCO, Council of Europe, G7
- Overview on the EU AI Act
- Further current legal and regulatory discussions on AI:

- How to deal with the use of copyright protected material as training data?
- How to deal with AI's output in terms of copyright law?
- What's ahead: status quo of the reform of the liability regime for AI in the EU

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Schriftliche Prüfung (sP) gemäß § 23 APO

Dauer/Form der Prüfung
90 Minuten

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
After completing the module, students will be able to...

- critically analyze central clusters of ethical challenges of AI, compare their effects on different areas of application and develop recommendations for dealing with these challenges
- integrate an ethical assessment in professional workstreams/AI development processes
- evaluate requirements of data protection law for AI and analyze gaps in the EU General Data Protection Regulation in the context of AI
- evaluate international guidelines on ethical AI in a differentiated manner, work out similarities and differences and formulate well-founded proposals for their implementation in their own professional environment
- evaluate basic legal requirements of the EU AI Act on AI systems and General Purpose AI-Models
- critically assess current legal debates on the use of copyrighted material as training data and the protection of AI outputs and develop and defend their own points of view
- assess AI practices based on basic structures of civil liability and have insights on the status quo of next phase of the EU's regulation of AI regarding the liability regime for AI
- communicate and cooperate better with ethical and legal professionals in their future professional environment

Literatur
Coeckelbergh, Mark (2021): AI ethics, Cambridge, MA: MIT Press.
Dignum, Virginia (2019): Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way, Cham: Springer Int. Publ.
Further basic texts will be announced or made available in the first session

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5173090 Natural Language Processing

Modulprofil

Prüfungsnummer
5173090

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Wintersemester

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminaristischer Unterricht

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Ivan Yamshchikov

Dozierende
Prof. Dr. Ivan Yamshchikov

Verwendbarkeit	MAI
Studiensemester	2. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
None

Empfohlene Voraussetzungen
Mathematical Foundations of AI
Artificial Intelligence and Machine Learning
Artificial Neural Networks and Cognitive Models

Inhalte
The model is implementing a learning-by-doing approach. The students read a variety of scientific publications that are fundamental for the topic, present and discuss these contributions as the course unfolds. They participate in a Kaggle-like NLP competition as well as submit several tutorials and the final capstone project.

The course covers the following set of topics:

1. Natural Language and Semantics:
— Introduction and Natural Language Processing Applications
— Text and Speech Basics
— Verbal Intelligence
— Information theory foundations
— Text representations

2. Research Methodology:
— Reading scientific papers
— Scientific reproducibility
— Empirical Methods

3. Tokenization
— BPE
— Information-theoretic approach to tokenization
— Unigram
— Modern Tokenisation methods

4. Word Embeddings
— Embeddings
— Global and local Representations
— Distributed Representations

5. Early Language Models
— Markov Chains
— Recurrent neural networks for text processing
— Autoencoders

5. Foundations of Large Language Models

— Transformers
— Large Language Models
— Pretraining
— RLHF
— Other forms of fine-tuning

5. Advanced chapters of of Large Language Models
— LLM bias
— LLM safety
— Agentic frameworks

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Portfolio

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
After successfully completing the module:

- students learn how to develop and apply the methods of Natural Language Processing.
- students are able to develop result-oriented applications that integrate suitable Natural Language Processing methods.
- students are able to analyse concrete industry tasks in the field of natural language processing from and RnD perspective, evaluate and select suitable methods and software components from the field of natural language processing to develop them further and fit for the suggested task.
- students organise themselves and their team independently in the application of learned methods of Natural Language Processing.

Literatur

- Kamath, Uday, John Liu, and James Whitaker. Deep learning for NLP and speech recognition. Vol. 84. Cham: Springer, 2019.
- Chris Manning and Hinrich Schütze, Foundations of Statistical Natural Language Processing, MIT Press. Cambridge, MA: May 1999.

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171060
Project Module

Modulprofil

Prüfungsnummer
5171060

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Wintersemester

SWS
8

ECTS-Credits (CP)
10.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 15 Std.

Selbststudienzeit: 285 Std.

Gesamt: 300 Std.

Lehrveranstaltungsart(en)
Projekt

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Magda Gregorová

Dozierende
Prof. Dr. Frank Deinzer,
Prof. Dr. Dr. h. c. Robert Grebner,
Prof. Dr. Frank-Michael Schleif,
Prof. Dr. Magda Gregorová,
Prof. Dr.-Ing. Pascal Meißner,
Prof. Dr. Dominik Seuß,
Prof. Dr. Andreas Lehrmann

Verwendbarkeit	MAI
Studiensemester	2. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
Keine

Empfohlene Voraussetzungen
Scientific Seminar

Inhalte
The students will work in groups to solve projects using AI techniques (supervised by at least one professor). The topics are provided by professors of the FIW, other faculties or external partners. In general the project will contain a software development (potentially accompanied by a technical solution) and a respective documentation or other form or presentation.

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
error

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Students can methodically process and solve comprehensive tasks. The students can develop and implement suitable solution strategies in a team. They know how team processes work and can assess how to contribute their own personality. The students can independently set up, implement, accompany and present a small AI project in a team. They can select and use appropriate development technologies and test and document their code.

Literatur
Literature will be distributed based on the respective project tasks.

3. Semester

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171130
Master Thesis

Modulprofil

Prüfungsnummer
5171130

Dauer
1 Semester

Häufigkeit des Angebots
Jedes Semester

SWS
0

ECTS-Credits (CP)
25.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 0 Std.

Selbststudienzeit: 750 Std.

Gesamt: 750 Std.

Lehrveranstaltungsart(en)
Selbststudium

Lehrsprache
Deutsch/Englisch

Organisation

Modulverantwortung
Prof. Dr.-Ing. Pascal Meißner

Dozierende
Prof. Dr. Arndt Balzer,
Prof. Dr. Frank Deinzer,
Prof. Dr. Frank-Michael Schleif,
Prof. Dr. Magda Gregorová,
Prof. Dr.-Ing. Pascal Meißner,
Prof. Dr. Ivan Yamshchikov,
Prof. Dr. Dominik Seuß,
Prof. Dr. Andreas Lehrmann

Verwendbarkeit	MAI
Studiensemester	3. Semester
Art des Moduls	Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO
50 ECTS points

Empfohlene Voraussetzungen
Regarding the actual writing of the thesis it is strongly recommended that the Scientific Seminar is already completed.

Inhalte
Independent preparation of a thesis and processing of a theoretical or practical task according to scientific methods.

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Thesis

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Deutsch/Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
With the submission of a Master's thesis and the successful assessment, students document that they
have understood the teaching content of the previous semesters and are able to apply it to tasks independently and successfully.

They are able to derive an innovative research question on a selected research area, which includes a sufficiently
significant and as yet unresearched research field.

They can work on this research question largely independently with an appropriate and meaningful
research design and lead to an objectively comprehensible, reliable and valid result.

The written result is at the level of international standards of scientific publications and, upon
successful completion, demonstrates the competences in terms of connectivity in the direction of doctoral projects.

Literatur
Is provided based on the topic, but needs also to be identified by the student as part of the master thesis.

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Fakultät Informatik und Wirtschaftsinformatik
Technische Hochschule Würzburg-Schweinfurt

Modul: 5171525
Strong Artificial Intelligence

Modulprofil

Prüfungsnummer
5171525

Dauer
1 Semester

Häufigkeit des Angebots
Unregelmäßig

SWS
4

ECTS-Credits (CP)
5.0

Workload
Angeleitete Studienzeit:
Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)
Seminar

Lehrsprache
Englisch

Organisation

Modulverantwortung
Prof. Dr. Dr. h. c. Robert Grebner

Dozierende
Prof. Dr. Dr. h. c. Robert Grebner

Verwendbarkeit	MAI
Studiensemester	3. Semester
Art des Moduls	FWPM

Verpflichtende Voraussetzungen gemäß SPO
Basic knowledge in the architecture of digital machines, formal languages, modeling notations and tools.

Empfohlene Voraussetzungen
none

Inhalte
Strong artificial intelligence deals about the question how to design and build human like thinking machines. In the course we elaborate, what is needed to build a digital machine that is able to think and act like an individual and is able to interact with other individuals. A large number of interconnected and adopted concepts and theories are necessary to implement human like skills and behaviour. A selection of these, like theory of information, action, time and space as well as a theory of thinking is discussed and developed in the course.

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung
Keine

Art der Prüfung
Sonstige Prüfung (soP) gemäß §§ 26, 27 APO

Dauer/Form der Prüfung
Mündliche Prüfung

Die konkrete Festlegung der abzuleistenden Prüfung erfolgt im Studienplan

Prüfungssprache
Englisch

Voraussetzung für die Vergabe von Leistungspunkten
Keine

Lernergebnisse
Understand concepts, theories and architectures of thinking machines. Understand what these theories must deliver.

Literatur
none