

Research Group Artificial Intelligence

Bachelor Theses

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University of Basel

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AI Research Group

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Gabi Röger



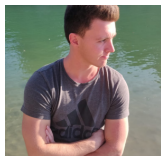
Florian Pommerening



Clemens Büchner



Remo Christen



Simon Dold



Claudia Grundke



Tanja Schindler



David Speck



Travis Rivera Petit



Esther Mugdan



Gustavo Delazeri

Research Focus

our main research areas:

- classical action planning
- heuristic search

Teaching

Teaching

autumn semester 2025:

- Discrete Mathematics in CS (Bachelor, 1st semester)
- Planning and Optimization (Master, 1st semester)

spring semester 2026:

- Algorithms and Data Structures (Bachelor, 2nd semester)
- Theory of Computer Science (Bachelor, 4th semester)
- Foundations of Artificial Intelligence (Bachelor, 6th semester)
- Seminar Knowledge, Reasoning and Planning
(Master, 2nd semester)

Lecture: Foundations of Artificial Intelligence (Spring 2026)

- lecture, Bachelor, 8 CP
- **lecturers:** Malte Helmert
- **target audience:** Bachelor students in 6th semester

contents:

- introduction and historical development of AI
- rational agents
- problem solving and search
- constraint satisfaction problems
- formal logic
- automated planning
- board games

Theses

Bachelor and Master's Theses

- **completed:** 85 Bachelor theses, 44 Master's theses
 ↪ <https://ai.dmi.unibas.ch/theses.html>
- **ongoing:** 2 Bachelor theses
- **interested?** **get in touch!**
 ↪ email to malte.helmert@unibas.ch or talk to me

Thesis Life Cycle

- T_0 : you contact me about interest in B.Sc. thesis
- $T_0 + 1$ week: initial meeting
 - you, me and potential supervisor
 - we suggest 3 topics to choose from
 - discuss possible starting date for thesis
- $T_0 + 3$ weeks: topic decision
 - you select a topic (or decline)
 - set up learning contract with official starting date T_1
- $[T_1, T_1 + 3 \text{ months}]$: work on thesis
 - 4 months possible if other commitments exist
 - weekly meetings with supervisor
 - ends with submission of thesis
- ~ 2 weeks later: thesis presentation
 - you are done, congratulations!

Bachelor's Thesis Example

Esther Mugdan (2022)

Optimality Certificates for Classical Planning

(supervised by Salomé Eriksson and Remo Christen)

- Theoretical framework for computer-verifiable proofs of optimality for solutions to shortest-path problems
- Integration with classical planning algorithms
- Implementation in the Fast Downward planner
- Evaluation of different algorithm variants and parameters

Bachelor's Thesis Example

Benedikt Heuser (2024)

Solving the Sliding Tile Puzzle with Post-Hoc Optimization

(supervised by Florian Pommerening)

- Adapting a general idea for state-space search heuristics to a specific problem
- Implementation in HOG2 codebase (University of Alberta)
- Evaluation of different algorithm variants and parameters

Bachelor's Thesis Example

Maria Desteffani (2025)

Encoding Delete-Free Planning Tasks in Domain-Independent
Dynamic Programming

(supervised by Florian Pommerening)

- Encode a standard AI problem in a new optimization framework (collaboration with University of Toronto)
- Compare efficiency to traditional solvers

The End