03-IMVP-LSPD	Logic Synthesis and Physical Design

Lehrform *(teaching format)* / **SWS** *(hours per week)*: 2VL + 2UE

Kreditpunkte *(credit points)*: 6

Turnus *(frequency)*: offered once (summer term 2024)

Inhaltliche Voraussetzungen *(content-related prior knowledge/skills)*:

Sprache *(language)*: English

Lehrende *(teaching staff)*: Prof. Dr. Marcel Walter

Studiengang *(degree program)*	Module	Semester
Informatik (Master)	IMVP, IMVP-SQ	ab 1.Sem.
Informatik (Bachelor VF)	nur *Freie Wahl*	ab 4.Sem.

Lernergebnisse / *Learning Outcome*:

- Students will get to know data structures and algorithms, and will be able to implement them, e.g.,
    - AIGs, MIGs, XAGs, kLUT networks,
    - logic optimization and technology mapping,
    - combinational equivalence checking,
    - floor planning,
    - global and detailed placement,
    - global and detailed routing,
    - legalization.
- Students will learn to operate open-source industrial-strength tools in the field, like ABC or OpenROAD.

Inhalte / *Contents*:

Modern computer chips consist of billions of transistors, making them some of the most complex systems ever created by humans. How does one design such intricate architectures? The answer is algorithms developed and fine-tuned over decades. In this course, students will learn about the techniques that automatically obtain computer chip designs from specifications. To this end, we will explore logic synthesis and optimization as well as partitioning, floorplanning, placement, and routing. Many of these algorithms are meta-heuristics that can be applied in completely different fields, too, like resource allocation, city planning, logistics, compilers, etc. Additionally, students will gather hands-on experience with state-of-the-art tools in logic synthesis and physical design, with the opportunity to participate in an international contest.

Hinweise *(remarks)*: The table lists only the primary / most specific modules to which this course is assigned.