03-IMVP-UCNB	Unconventional Computing: Nanotech and Biochips

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	ab 1.Sem.
Informatik (Bachelor VF)	nur *Freie Wahl*	ab 4.Sem.

Lernergebnisse / *Learning Outcome*:

Students will learn

- about state-of-the-art manufacturing at the atomic scale,
- the principles of charge-based information representation and computing,
- the principles of electro-wetting and channel-based microfluidic devices,
- about algorithms to automate design processes in both technology fields,
- to operate state-of-the-art simulators and design tools in both technology fields,
- to argue about ethical implications of these technologies.

Inhalte / *Contents*:

Does bit information have to be encoded in electrical currents, or can we use something else? How about the states of magnetic nanoparticles, arrangements of crystal lattice defects, or polarizations of individual molecules? This course delves into the principles of nanoscale computing at the edge of Moore’s Law, where conventional paradigms are reimagined. Additionally, we will take a look beyond Moore’s Law to investigate the cutting-edge domain of biochips, devices that revolutionize biological and chemical analysis through microfluidic technology. Students will gain insights into the fabrication, application, and potential of these technologies, and will discuss everything from algorithms to ethical implications, while gathering hands-on experience with state-of-the-art tools in the domain.

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