03-DMM-MI-ACC	Algorithms for Creative Coding

Lehrform *(teaching format)* / **SWS** *(hours per week)*: 4K

Kreditpunkte *(credit points)*: 6

Turnus *(frequency)*: usually, each summer term

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

Sprache *(language)*: English

Lehrende *(teaching staff)*: Dr. Tim Laue

Studiengang *(degree program)*	Module	Semester
Digital Media (Master)	M-MI	from 2nd sem.
Digitale Medien (Bachelor)	nur *Freie Wahl*	ab 4.Sem.
Management Information Systems (Master)	MIS-INF2	from 2nd sem.
Digital Media & Society (Master)	B.1	ab 1.Sem.
Medienkultur & Globalisierung (Master)	B.3	ab 1.Sem.

Lernergebnisse / *Learning Outcome*:

- Understand the concept of autonomous agents
- Learn to implement finite state machines and force fields for creating autonomous behaviors and motions, e.g. for NPCs or swarms
- Understand the application of evolutionary algorithms to parameter optimization
- Learn to implement basic physical concepts, such as acceleration, drag, of friction, for realizing realistic motions
- Understand the major concepts of a physics engine and being capable of creating an own application that uses a physics engine
- Learn to apply convolutions to two-dimensional grids in order to implement typical image filters or to realize cellular automata

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Inhalte / *Contents*:
This course teaches a number of programming techniques that are relevant for dynamic and interactive applications, which are typical for the field of Digital Media, but are not covered by standard programming courses.

This course is for students who have already attended a programming course and are familiar with basic programming concepts such as variables, conditionals, loops, and objects. In this course, we will extend these programming skills towards more complex actions and interactions on the screen. We will be using the Processing programming environment. The main literature will be “The Nature of Code” by Daniel Shiffman (the book is available online for free).

One main topic of this course will be autonomous agents, e.g. programs that are “intelligent” (not really …) and make own “decisions”, such as non-player characters in computer games. Some basic concepts regarding decision-making, path planning, and swarm behaviors will be introduced. We will also have a short look at evolutionary algorithms, which enable our programs to adapt over to time.

Furthermore, we fill focus on objects that move, accelerate, collide, and bounce. We will explore the basic formulas and approaches that allow us to let dynamic things happen on our screens. The basic concepts and the usage of a physics engine will be explained, too.

Hinweise *(remarks)*: The table lists only the primary / most specific modules to which this course is assigned. However, this course is not available for students of computer science, business informatics, or systems engineering.