

Entwurf der
Studien- und Prüfungsordnung
des Studiengangs
Games & Immersive Media B.A.

Stand 15.3.23

Zusammengestellt von
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Grundsätzliches

- Name: Games & Immersive Media
- Abschlussbezeichnung: Bachelor of Arts
- Fächergruppe: Kunst, Musik, Gestaltung
- Studienbereich: VIII. 2 Neue Medien
- Grundstudium 2 Semester, Hauptstudium 5 Semester
- 210 ECTS
- 5. Semester ist Praxissemester
- Projektorientierung
- Vordringlich Blockunterricht
- Bilingual Deutsch/Englisch, Englischanteil > 50% angestrebt
- Dedizierte Räume für Kohorten
- Auslandssemester wird empfohlen und unterstützt

Qualifikationsziele

fachliche Kompetenzen

- Solid foundation in design and implementation of visual arts, software, sound and interaction.
- Profound knowledge and skills in team management, producing and marketing.
- Solid theoretical background in media design and technology
- Experience in working with teams on a variety of projects using agile methods.

überfachliche Kompetenzen

- Skill to work in a multicultural team in the German and English languages.
- Awareness of the implications of the development and use of games and immersive media on society.
- Skills and confidence to use complex technologies in a creative and artistic process.

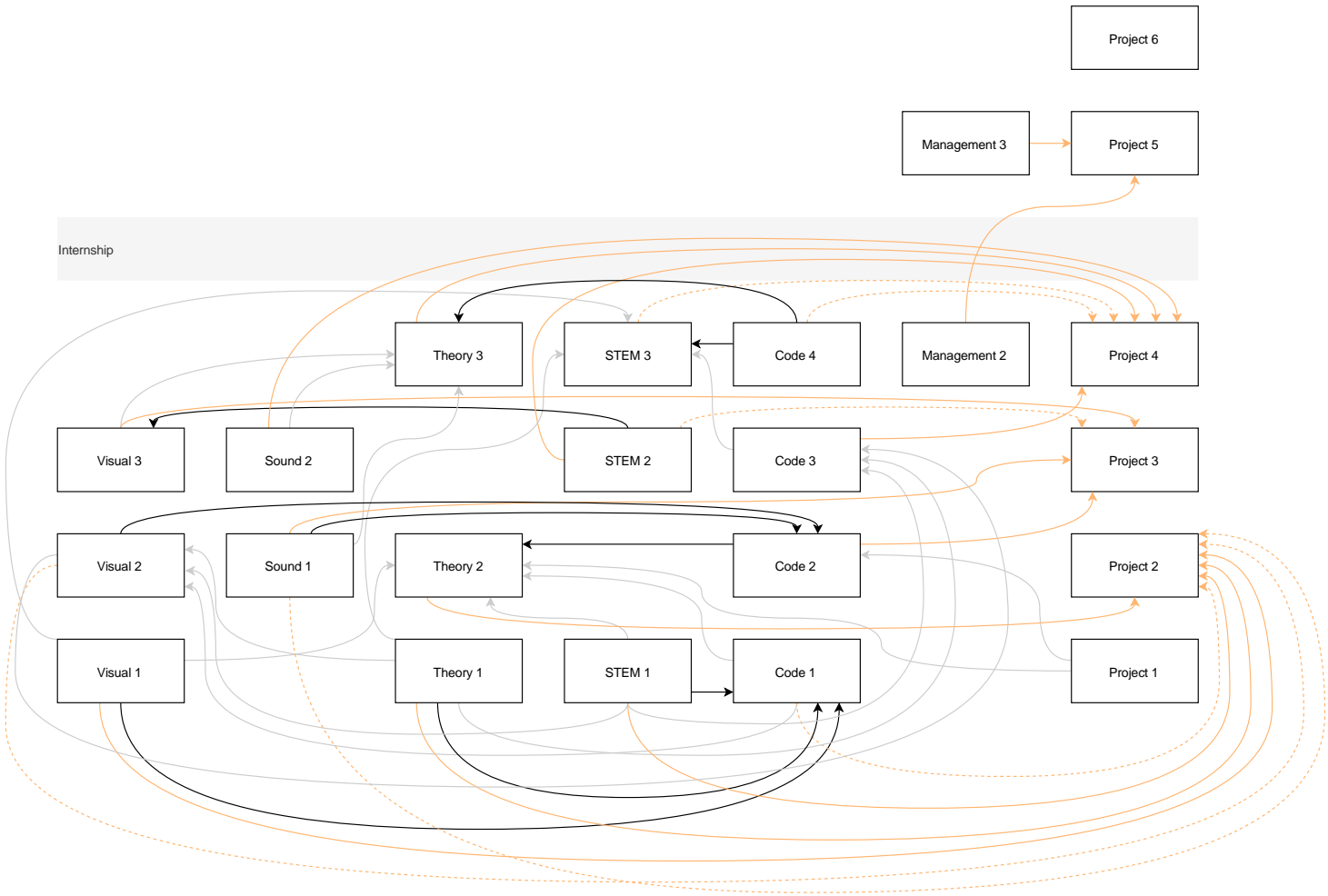
berufsfeldorientierte Ziele

- A solid foundation for a variety of professions in the game industry.
- A solid foundation for a variety of professions in the field of immersive media outside of the games industry.
- Further expertise in specific fields of choice such as computer science, media technologies, digital asset creation, media management, media design.

Überblick

						WPM 12 All - #3 - #4	Project 6 18 eg All - Bachelor Thesis - Thesis Seminar
					Management 2 6 4NN	WPM 12 All - #1 - #2	Project 5 12 eg 3All - Complex Digital Project
Internship							
		Theory 3 5:6 eg 4NN	STEM 3 5:6 e 2GR,2UH	Code 4 6 e 2RL,2JA,2SH	Management 1 5:6 4NN		Project 4 10:6 eg 3All - Advanced Digital Project
Visual 3 5:6 e 2CM,1RR,1NN	Sound 2 5:6 eg 4NN (Tross)		STEM 2 5:6 e(g) 4TSr	Code 3 5:6 e 2UH, 2CM			Project 3 10:6 eg 3All - Simple Digital Project
Visual 2 5:6 e 2CM,2NN	Sound 1 5:6 eg 4NS	Theory 2 5:6 e 2JD,2TSr		Code 2 5:6 e 4JD			Project 2 10:6 eg 3All - Physical Game
Visual 1 6 eg 2CF,4NN		Theory 1 6 g(e) 4TSI	STEM 1 6 e(g) 2RL,1UH.1TSr	Code 1 6 e 3JD,1RR			Project 1 6 eg 2KH,2UH - Entry Project

Abhängigkeiten



Sound 1 Norbert Schnell

Content

- Basics of sound, listening and sonic interaction
- Basics of acoustics and psychoacoustics
- Basics of digital audio (in sound and music processing)
- Interactive audio tools
- Spatial/immersive audio techniques
- Techniques of interactive audio design

Lecturer

- Norbert Schnell (4 SWS)

Credits

- 5 ECTS / 6 ECK

Language

- German / English

Teaching

- Seminar
- preferably 3 week block

Assessment

- 1 sbA

Sound 2 Norbert Schnell

Content

- Basics of sound design
- Foley and sound effects
- Sound libraries
- Music genres
- Music and emotion
- Music in context
- Music analysis
- Basics of composition (rhythm, melody, harmony)
- Basics of instrumentation and orchestration

Lecturer

- NN HfM Trossingen (4 SWS)

Credits

- 5 ECTS / 6 ECK

Language

- German / English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1 sbA

STEM 1 Thomas Schneider

Module STEM 1

Contents:

Geometry / Linear Algebra / Graphical projections:

- Geometry of 2D and 3D:
- Coordinates of Points and Vectors
- Change of Coordinate Frames
- Systems of Linear Equations
- Metric Spaces: Distances, Lengths, Angles
- Matrices and Linear Transformations
- Homogeneous Coordinates
- Matrices and Affine Transformations

- Graphical Representations of 3D Objects

- Parallel / Axonometric Projections
- Linear Perspective: Image Construction using Desargues' Theorem
- Points at Infinity and Vanishing Points
- Projection Matrices: Unified Approach

- Thomas Schneider, Ruxandra Lasowskis, Uwe Hahne
- Adjunct Lecturer(s)

Credit Point Assignments:

6 ECTS/ECK

Language

- English
- German upon consensual request of all participants

Teaching Format:

- Seminar (15 weeks plus exam period)

Assessment:

- 1 sbA (Practical Work)
- 1K (Final Examination)

Lecturers

STEM 2 Thomas Schneider

Module STEM 2

Contents:

- Foundations
- Basic Calculus
- Parametrized Curves in 2D and 3D
- Elements of Kinematics
- Dynamical Systems
- Deterministic Models, Differential Equations
- Setting up and Evaluating Models for Example Systems
- Project Work: Visualization of the Behavior of Simple Systems by Means of Web Applications
- Foundations of Camera Optics
- Paraxial Ray Tracing
- Camera Lenses and their cardinal points
- Focus, Magnification, Depth of Focus
- Comparison: Optical Properties of the Human Eye vs. Camera Optics

- Physics Engines

Lecturers

- Thomas Schneider
- Adjunct Lecturer(s)

Credit Point Assignments:

5 credit points (ECTS) / 6 credit point (ECK)

Language

- English
- German upon consensual request of all participants

Teaching Format:

Seminar

Three-Week Block

Assessment:

- 1 sbA (Practical Work)
- 1 sbK (Final Examination)

STEM 3 Uwe Hahne

Contents

- Practical electronics and signal processing
- Physical Computing
- Computer Vision for Extended Reality (XR)
- IoT, Tangible Interfaces

Lecturers

- 2SWS Gabriel Rausch
- 2SWS Uwe Hahne

Points

- 5 ECTS
- 6 ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1 sbA (small project with hardware)

Prerequisites

Foundations of digital information and graphics processing (Bits, Bytes, Pixel, Colorcodes, Bitmaps, etc.)

Foundations of physics, basic calculus (differentiation)

Foundations of hardware architectures (CPU, GPU)

Linear algebra

Fundamental UI-Design

Some knowledge of Human-Computer-Interaction

Basic Machine Learning concepts

Obtained in

Theory1

STEM2

Code3

STEM1

Visual1

Theory1

Code4

Theory 1 Thomas Schlegel

Theory 1

- Computer Science & Computing Introduction
- Interactive Systems
- Human Computer Interaction & User-Centered Design
- Cognition and Perception

Contents

- Why Computer Science?
- Current Research and Technology
- History of the Computer
- Technology Hardware, von Neumann
- Computer Science Basics: Bits & Bytes, Pixels
- Boolean Logic
- Perception (Visual, Auditive and Haptic), including Colors
- Cognition and Memory
- HCI topics
- User-Centered Design & User-Centered Design Process

Lecturers

- 5 SWS Thomas Schlegel

Points

- 6 ECTS

Language

- German (English on Request)

Teaching

- Seminar
- 3 week block or semester lecture

Assessment

- 1sbK

Theory 2 Jirka Dell'Oro-Friedl

Contents

Seminar 1: Game Design

- Game Studies
- Design Graphs
- Design Methodologies

Seminar 2: Probability and Strategy

- Elementary Combinatorics
- Finite Probability Spaces: Examples
- Bernoulli Processes and Binomial Distributions
- Expected Value and Variance
- Conditional Probabilities, Bayes' Theorem
- Game Theory
- Strategy

Lecturers

- Seminar 1: 2SWS Jirka Dell'Oro-Friedl
- Seminar 2: 2SWS Thomas Schneider

Points

- 5 ECTS
- 6 ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- Seminar 1: 1sbK (e-Test)
- Seminar 2: 1sbKO

Prerequisites

Theory 1

Visualization, Storyboarding

Design graphs

Design Thinking

Perspective

Obtained in

Theory 1

Visual1

Code1, Code2

Management1

Visual1, STEM1

Theory 3 N.N.

Contents

- Level Design
- Mission Design
- Narrative Design
- Storytelling
- Environmental
- UX-Design

Lecturers

- 4SWS NN

Points

- 5 ECTS
- 6 ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1sbK (e-Test)

Prerequisites
Theory 2

Sound1, Sound2

Visual1, Visual2, Visual3

Game AI

Multiplayer

Obtained in
Theory 2

Sound1, Sound2

Visual1, Visual2, Visual3

Code4

Code4

Assessment

- 1 sbA

Visual 1 Christian Fries

Contents

- Draft and sketching
- Figurative thinking
- Storyboard
- Color theory and practical application
- Visual Character-Development
- UI-Design-Basics

Lecturers

- 2 SWS Christian Fries
- 4 SWS nn

Points

- 6 ECTS / ECK

Language

- German / English

Teaching

- Seminar
- preferably 3 week block

Visual 2 Christoph Müller

- 3D Modeling
- Box Modeling
- Sculpting
- Poly Modeling/Polygon Flow
- Retopology
- Materials Lights and Texturing
- UV Unwinding
- Texture painting
- Normal Mapping
- Material generation for Game Engines
- Light and Material
- Character
- From Concept Art to 3D-Primitive Block-Out
- Animation Basics
- Keyframe Animation
- Path Animation
- From Models to Assets
- Modeling for Realtime Engines
- Materials for Realtime Engines

Lecturers

- 2 SWS Christoph Müller
- 2 SWS NN

Points

- 5 ECTS / ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment 1 sbA (small project: from concept art to game engine asset)

Prerequisites

Creating Concept Art

Basic understanding of media file formats, especially Pixel and vector formats

Basic understanding of 3D Vectors, Normals, Dot Product

Obtained in

Visual 1

Code 1 / Theory 1

STEM 1

Visual 3 Christoph Müller

- Advanced Material and Shading
 - 3D-Animation (Realtime)
 - Non-linear animation
 - Animation State-machines
 - Animation Blending
 - Combining Physics and scripted Animation
-
- Character Animation
 - Rigging
 - Forward / Inverse Kinematics
 - Walk Cycles
-
- Visual Design
 - 2D Animation

Lecturers

- 1 SWS Regina Reusch
- 2 SWS Christoph Müller
- 1 SWS NN

Points

- 5 ECTS / ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment 1 sbA (small project: simple animated character)

Prerequisites

Concept Art

3D Modelling for Realtime

Basic understanding of physical facts (mass, force, velocity, acceleration)

Obtained in

Visual 1

Visual 2

STEM 2

Management1 N.N.

Contents

- Producing
- Quality Management
- User Research
- Community Management
- Financial calculation

Lecturers

- 4SWS NN

Points

- 5 ECTS
- 6 ECK

Language

- ?

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1sbK (e-Test)

Prerequisites

Obtained in

Management2 N.N.

Contents

- Publishing
- Entrepreneurship
- Monetization
- Marketing
- Lifecycle Management

Lecturers

- 4SWS NN

Points

- 6 ECTS / ECK

Language

- ?

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1sbK (e-Test)

Prerequisites

Obtained in

Code1 Jirka Dell'Oro-Friedl

Contents

- Creative Coding
- Web Fundamentals
- 2D-Scenegraph
- Procedural Code
- Coding Audiovisuals
- Computational Thinking

Lecturers

- 3SWS Jirka Dell'Oro-Friedl
- 1SWS Regina Reusch

Points

- 6 ECTS / ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1 sbK (e-Test)

Prerequisites

Foundations of digital information and graphics processing (Bits, Bytes, Pixel, Colorcodes, Bitmaps, Vectorgraphics etc.)

Foundations of digital sound (Sampling, Playback)

Experience in creating graphics manually

Elementary linear algebra

Fundamental UI-Design

Some knowledge of Human-Computer-Interaction

Obtained in

Theory1

STEM1 (Matthias ist interessiert hier ein Beitrag zu leisten)

Visual1

STEM1

Visual1

Theory1

Code2 Jirka Dell'Oro-Friedl

Contents

- Software Design
- Object Orientation
- 3D-Scenegraph
- Game Patterns & Techniques
- Component Entities

Lecturers

- 4SWS Jirka Dell'Oro-Friedl

Points

- 5 ECTS
- 6 ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1sbK (e-Test)

Prerequisites

Code1

Spatial audio

Modelling, texturing, lighting

Foundations of software engineering

Perspective

Obtained in

Code1

Sound1

Visual2

Management1

Visual1, STEM1

Code 3 Uwe Hahne

Contents

- Realtime Computer Graphics
- Shader
- Advanced SW design patterns
- Computation Performance
- Advanced Audiovisuals

Lecturers

- 2SWS Christoph Müller
- 2SWS Uwe Hahne

Points

- 5 ECTS
- 6 ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1 sbA (small project with GPU coding and review)

Prerequisites

Foundations of digital information and graphics processing (Bits, Bytes, Pixel, Colorcodes, Bitmaps, etc.)

Computer Graphic basics (Vertices, Faces, Meshes, Scenegraphs, Textures, Lighting)

Linear algebra (Matrix, Vector)

Coding skills that allow to read any language

Obtained in

Theory1

Visual2

STEM1

Code 2

Code 4 Ruxandra Lasowski

Contents

- Game AI
 - Finite Automata und Behaviour Trees
 - Agents, Search Problems, Uninformed Search
 - Informed Search (A* and Heuristics)
 - Adversarial Search and Games I: Minimax, Alpha-beta Pruning
 - Adversarial Search and Games II: Expectimax, MCTS
 - Reinforcement Learning
- Network
 - Database
 - Relational and NoSQL databases
 - Network
 - Server APIs
 - Backend services
- Network, Multiplayer:
- Internet- and Streaming: Networking Protocols Basics
- Optional: Dedicated Gameserver: Architectures, APIs
- Networking Multiplayer-Gameserver:
 - a) Online: Client Server /P2P /MMOG Architectures and Protocols
 - b) Local: LAN/WLAN
 - c) Dedicated MMOG@home: NAT, DDNS, STUN
 - Cloud Gaming over public networks (Shadow/Blade/Google)

Lecturers

- 2SWS Ruxandra Lasowski
- 2SWS Stephanie Heintz
- 2SWS Jürgen Anders

Points

- 5 ECTS
- 6 ECK

Language

- English

Teaching

- Seminar / eduScrum
- preferably 3 week block

Assessment

- 1sbK
- 1sbA

Prerequisites

Basics in Computer science
Basics for AI

Obtained in

Theory 1

STEM 1, Theory 1 + 2

Assessment

Project1: Entry Project Nikolaus Hottong

- 1 sbA

Contents

- No-Code/Low-Code Game Project
- Agile Mindset
- Methods (Scrum, Design Thinking, Team Building)
- Playful approach to media development
- Project-based learning
- Presentation and event planning

Lecturers

- Nikolaus Hottong (2 SWS)
- Uwe Hahne (2 SWS)

Points

- 6 ECTS/ECK

Language

- englisch

Teaching

- Seminar / eduScrum
- 3 week block, preferably first block of course (-> Teambuilding)

Project2: Physical Game

Contents

- Design and creation of a physical game, optionally with digital augmentation
- Practical application of various skills acquired in previous modules
- Team- and projectmanagement
- Practice visualization, documentation, communication, presentation
- Work with physical material to create prototypes

Lecturers

- 3SWS in total for three docents as jury

Points

- 10 ECTS
- 6 ECK

Language

- English/German

Teaching

- Workshop / Scrum
- preferably 6 week block

Assessment

- 1A

Prerequisites

Visual Design

Obtained in

Visual1

Foundations of perception & cognition

Theory1

Perspective

Visual1, STEM1

Probability, strategy and game theory

STEM1, Theory2

Foundation of game design

Theory2

3D-Modelling for stills or 3D-printing, if applicable

Visual2

Audiodesign, if applicable

STEM1, Sound1

Generative design of stills if applicable

Code1

Project3: Simple Digital Project

Contents

- Design and creation of a simple interactive application
- Practical application of various skills acquired in previous modules
- Implementation of graphics, sound, behaviour, animation, text
- Team- and projectmanagement
- Practice visualization, documentation, communication, presentation
- Work with digital material to create prototypes

Lecturers

- 3SWS in total for three docents as jury

Points

- 10 ECTS
- 6 ECK

Language

- English/German

Teaching

- Workshop / Scrum
- preferably 6 week block

Assessment

- 1A

Prerequisites

Project1

Interactive & immersive audio

Software design, software engineering

2D and/or 3D-animation

3D-modelling for interaction, if applicable

Coding

Foundations of physics engines and dynamical systems, if applicable

Obtained in

Project1

Sound1

Management1, Code2

Visual3

Visual2

Code1, Code2

STEM2

Project4: Advanced Digital Project

Contents

- Design and creation of an advanced interactive application
- Practical application of various skills acquired in previous modules
- Implementation of advanced technologies e.g. AR/VR, spatial audio/video, tangible interfaces
- Team- and projectmanagement
- Practice visualization, documentation, communication, presentation
- Work with digital material to create advanced prototypes

Lecturers

- 3SWS in total for three docents as jury

Points

- 10 ECTS / 6 ECK

Language

- English/German

Teaching

- Workshop / Scrum
- preferably 6 week block

Assessment

- 1A

Prerequisites

Project2

Obtained in

Project2

Spatial audio

Sound1

Music & sound design

Sound2

Modelling and animation in 2D and 3D

Visual2, Visual3

3D-Modelling for interaction, if applicable

Visual2

Advanced coding

Code3

Foundation of physics engines & dynamical systems

STEM2

Storytelling, narrative design if applicable

Theory3

UX-Design

Theory3

Foundations of multiuser experiences, if applicable

Code4

Advanced computer-Interaction, if applicable

Code4

Tangible interfaces, computer vision, physical computing if applicable

STEM3

Project5: Complex Digital Project

Assessment

- 1A

Contents

- Professional Design and creation of a complex interactive application
- Practical application of various skills acquired in previous modules
- Consideration and calculation of professional publishing, marketing, monetization, quality assurance.
- Practice professional workflow

Prerequisites

Obtained in
Project3

Project3

Lecturers

- 3SWS in total for three docents as jury

Prerequisites

Project3

Obtained in

Project3

Points

- 12 ECTS / ECK

Producing, business calculation, advanced
management

Management 1+ 2

Language

- English/German

Teaching

- Workshop / Scrum
- preferably 8 week block

Project6: Final Assignment

Contents

- Bachelor Thesis
- Thesis Seminar

Lecturers

- 2SWS all docents

Points

- 18 ECTS / ECK

Language

- English/German

Teaching

Assessment

- 1 T: 12 ECTS/ECK
- 1 PN: 6 ECTS/ECK

Qualifikationszielmatrix

		Unterstützung der Qualifikationsziele in den Modulen (0=keine, 1=indirekte, 2=direkte)																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Nr. Qualifikationsziel		Summe	Project 1	STEM 1	Code 4	Visual 1	Visual 2	Visual 3	Code 3	STEM 2	STEM 3	Sound 1	Sound 2	Theory 1	Theory 2	Theory 3	Code 1	Code 2	Project 2	Project 3	Project 4	Project 5	Project 6	Management 1	Management 2	WPM 1	WPM 2	WPM 3	WPM 4
fachliche Kompetenzen																													
1	Solid foundation in design and implementation of visual arts, software, sound and interaction	27				1	2	2	2	2		2	2	2	1	1	1	2	2	1	1	1	1	1					
2	Profound knowledge and skills in team management, producing and marketing	20					1	1	1	1						1	1			2	2	2	2	2	2	2			
3	Solid theoretical background in media design and technology	29		2	2	2	2	2	2	2	2	2	2	1	2	2	2	1	1						1	1			
4	Experience of working in teams on a variety of projects using agile methods	30	2			1	2	2	2	2	2	1						1	1	2	2	2	2	2	2	2			
überfachliche Kompetenzen																													
5	Skill to work in a multicultural team in the German and English language	29	2	2		1	1	1	1	1	1	1				1	1	1	1	2	2	2	2	2	2	2			
6	Awareness of the implications of the development and use of games and immersive media on society	20	1			1	1	1	1						2	2	2			1	1	1	1	1	2	2			
7	Skills and confidence to use complex technologies in a creative and artistic process	30				1	2	2	2	1		2	2	2	1		1	2	2	2	2	2	2	2					
berufsfeldorientierte Ziele																													
8	A solid foundation for a variety of professions in the game industry	38	1	1		2	1	2	1	2		2	1	1	1	2	1	2	2	2	2	2	2	2	1	1	1	1	1
9	A solid foundation for a variety of professions in the field of immersive media outside of the games industry	38			1	2	1	1	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1
10	Further expertise in specific fields...	12																						2	2	2	2	2	2