

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
- Die Ordnung wurde inhaltsgetrieben erstellt. Um die zu erwartenden und konzipierten Lasten korrekt darstellen zu können, wurde neben der Auszeichnung nach Eckwertepapier (ECK) auch die Auszeichnung nach Akkreditierungsverordnung (ECTS) vorgenommen.

## 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.

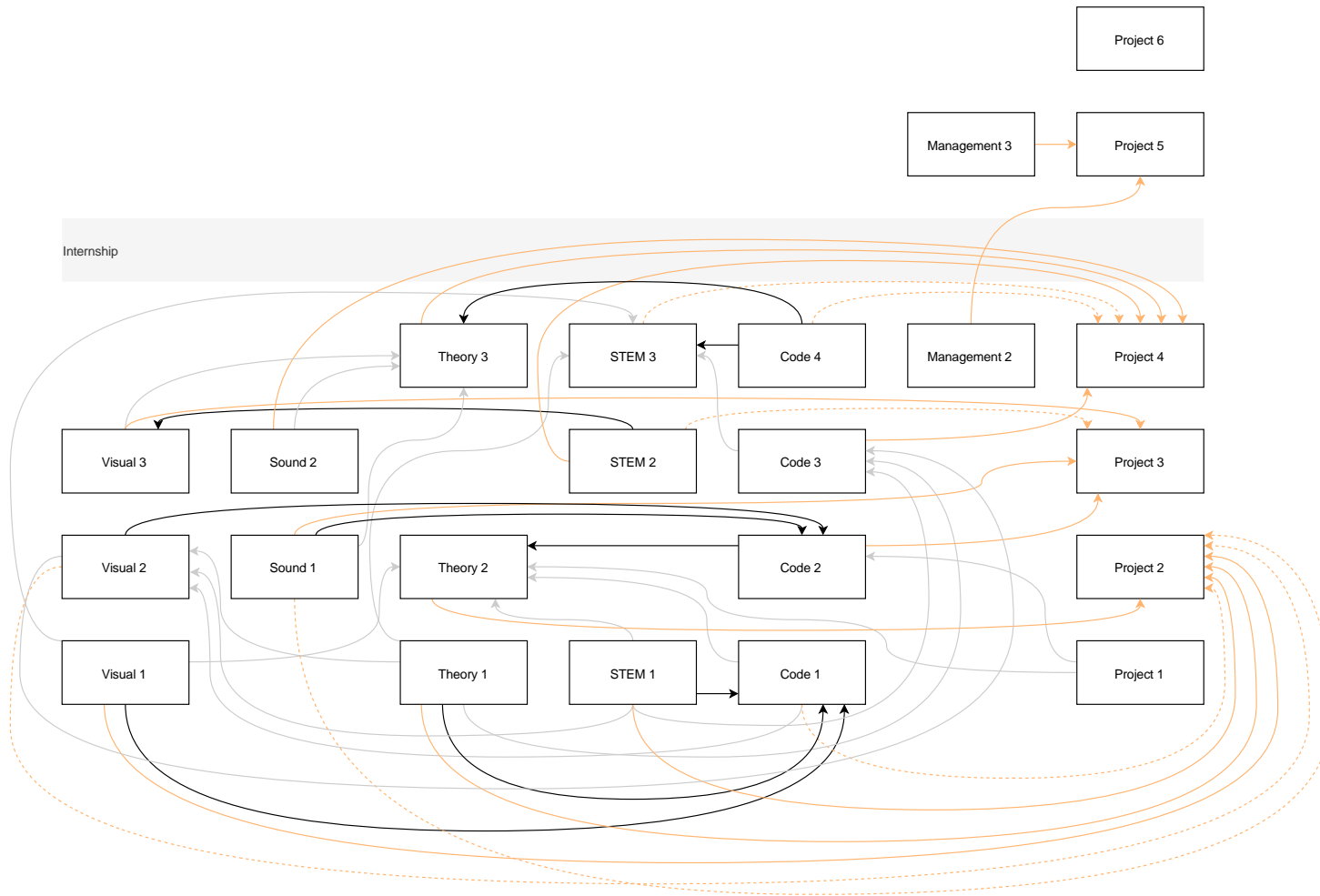
### berufsfeldorientierte Ziele

- 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	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	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	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	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	1
10	Further expertise in specific fields...	12																						2	2	2	2	2	2