

Qualification Goal.....	3
Concept for the Degree Program.....	5
Subject Areas and Modules.....	7
General Studies.....	7
Scientific Work.....	7
Narrative Design I.....	9
Audiovisual Staging.....	11
Applied Research.....	13
Media Management.....	14
Game Design.....	16
Game Design I: Conception.....	16
Game Design II: Documentation and Production.....	18
Game Design III: Interaction Design.....	20
Narrative Design II: Interactive Storytelling.....	22
Game Design IV: Level Design and Game Guidance.....	24
Game Design V: Process Management.....	26
Experimental Research.....	28
Basics Art.....	29
Basics Game Art I: Visualization Processes.....	29
Basics Game Art II: Asset Design I.....	31
Basics Game Engineering.....	33
Mathematics I.....	33
Programming I.....	35
In-Depth Art.....	37
Concept Art I: Staging.....	37
Game Asset Production I: 3D-Construction Techniques.....	39
Concept Art II: Character & Creature Design.....	41
Game Asset Production II: Production Pipeline.....	42
Concept Art III: Environment Design.....	44
Game Asset Production III: World & Environment Design.....	45
Concept Art IV: Asset Design.....	47
Game Asset Production IV: Morphological Staging.....	49
In-Depth Game Engineering.....	51
Computer Science I.....	51
Programming II.....	52
Software Engineering.....	54
Graphic Programming.....	56
Computer Science II.....	58
Game KI.....	60
Backend-Development.....	62
Game Physics.....	64

Projects	66
Project I	66
Project II	68
Project III	70
Project IV	72
Project V	74
Internship Semester	76
Internship Semester and Presentation.....	76
Bachelor-Degree	78
Final Thesis and Colloquium	78

Qualification Goal

Graduates can understand and methodically solve the challenges that arise in their working environment as well as the fundamental technical and creative principles involved in the development of digital computer games and interactive applications. In addition, by systematically increasing their ability to criticize and discuss, graduates can question ethical, ideological, social and moral concepts and develop them independently.

Graduates have knowledge of the following areas:

- IT
- Academic Work
- Art and Visual Design
- Game and Media Design
- Project Management
- Social Skills

Graduates of the "Game Design (BSc)" have the following specialist knowledge based on current teaching and research in their field:

They have a broad basic knowledge and overview.

- of the history of computer games and the interaction options or game mechanics on which the computer games are based as well as different platforms and monetization strategies.
- of selected areas of natural sciences, putting theory into practice with examples. They are therefore familiar with the mathematical and IT principles for the technical implementation of interactive applications in general and computer games in particular.
- in selected areas of design theory and art studies, putting theory into practice with examples. They therefore understand the key tasks, principles and creative processes in the conception of virtual worlds and the visual design of interactive media.

They are familiar with

- the methodological interaction of software engineering, design and artistic requirements in the context of interactive media. In addition to creative and artistic theoretical and factual knowledge, they are familiar with the academic way of working.
- methodology, coordination and communication in selected areas of media management and the basic tasks and functions in the context of team and project-oriented working methods.

Graduates are able to

- design games, plan the implementation of games as a project and carry out the production.
- identify, abstract, structure and holistically solve technical problems.
- systematically analyse creative challenges and develop practical solutions.
- select and apply adequate artistic and design methods and techniques.
- develop, implement and optimise application-related solutions based on an academic assessment basis.
- classify industry-specific developments technically and strategically and anticipate the resulting effects on your work.
- select suitable software systems, classify them and integrate them effectively into the implementation processes.
- identify and interpret relevant specialist sources in technical and creative areas and use them in their work.

Graduates can

- understand and assess the technical, creative, artistic and social framework of computer game development.
- make rational, justified decisions and critically tackle potential problems with solutions.
- find holistic and methodologically efficient solutions for interdisciplinary questions.
- recognise the ethical, ideological, social and moral consequences of decisions.
- effectively exchange information about content and problems with colleagues.
- work constructively and efficiently with other people in different professional situations to meet targets.
- work effectively individually or as a member of a project team, taking into account internal restrictions and external (customer) requirements.
- assert gender-specific knowledge in design and in artistic design.
- put academic methods into practice and implement innovative developments into everyday work.
- due to the practical focus in their studies, graduates can directly integrate and apply the skills acquired during their studies to their work, e.g. as a games developer in the professional environment.
- effectively keep up to date with current software solutions and implement them.
- continue to learn independently.

The personal development of graduates is systematically challenged and promoted in every course:

- Critical faculties and the ability to discuss are increased through the mutual, constructive critique of designs and solution strategies.
- Dogmatic ways of thinking are broken down through the instruction in scientific thinking and research and the promotion of the ability to express oneself verbally and in writing.
- Self-confidence is increased through the development of sustainable and well-founded decisions within project phases and reproducible learning successes.
- The ability to work in a team and social skills are challenged by dynamic and changing project management concepts and team constellations, taking into account the "human factor" beyond time, budget and quality of the work results.
- Self-determined learning and setting of priorities within the study program make it possible to experience the consequences of action or inaction (e.g. through the examination of the learning offer with regard to the self-determined deepening, or the challenge of facing external framework conditions, for which the so-called comfort zone must be left).
- The guided departure from the protected space of the university during the internship requires the transfer of what has been learned into practice and allows for the examination of alternative roles and concrete job profiles.
- Discussing design decisions in terms of ethical, ideological, social and moral issues requires addressing potential consequences and thus promotes increased civil awareness and engagement.
- The promotion of interdisciplinary work between e.g.: Programmers, designers, conceptual designers, strategists, etc. also strengthens awareness of one's own role in the team; reflection on this finally promotes insights into "soft skills" such as teamwork and reliability.

Concept for the Degree Program

The degree program "Game Design" is a practice-oriented Bachelor's degree program that teaches the development of real-time 2D and 3D applications, especially computer and video games. The focus here is primarily on the conception, planning, creation, editing, integration and programming of corresponding projects and content. An entrance examination checks the basic requirements in the technical, creative and artistic fields and ensures the aptitude of the first-year students.

The courses can be divided into five subject areas:

- The area "General Studies" includes general basic modules such as "Scientific Work" and "Applied Research" as well as modules with potential interfaces to other MD.H degree program such as "Media Management" and "Audiovisual Production".
- In the area of "Game Design", specialist competences are acquired in the area of conception, planning and implementation of games and game content.
- In the field of "Game Art", professional competences are acquired in the field of visual design of games and game content.
- In the area of "Game Engineering", specialist skills are acquired in the area of the technical implementation of games and game content as well as the corresponding basics of computer science.
- The "Practice" area brings together the skills and knowledge acquired in the individual subject areas in practical application in project work and a practical semester.

The first semester serves as orientation and teaches the basics, especially in the areas of "Game Art" and "Game Engineering". In the 2nd to 5th semesters, students choose either the specialization "Game Art" or "Game Engineering" and accordingly either deepen their competences in the area of visual design, especially that of concept art and the production of game assets, or in the area of computer science and programming. The area of "Game Design" offers a common framework for both specializations and combines technical and design aspects with concrete questions in the area of staging, dramaturgy and production.

Due to the fast pace of the games industry, an orientation towards current technical developments such as changes in the area of business models, user interfaces or development environments is a basic requirement for preparing students for seamless entry into professional life. This automatically results in a current reference to research. Theoretical basic knowledge must be applied in the current context. Due to the interdisciplinary character of the medium of computer games, students are forced to expand their specialized knowledge on a broad basis and to provide transfer services between the individual areas such as conception, presentation and technical implementation. Media products (e.g. in the project phases) as well as scientific papers (e.g. in the modules 1.1. and 2.7.) are created as examination achievements within the study program.

A close relationship to practice is ensured through the project work carried out and the practical semester. The ability to work out solutions alone and in a team is central. The students have to apply their theoretical knowledge to concrete examples. Due to the tasks of the entrepreneurial project model, there is a direct reference to various aspects of media management, whereby independence in the research and application of specialist knowledge is explicitly promoted, which additionally supports the transfer from theory to practice.

The Bachelor's thesis includes a theoretical and a practical part or, in special cases, can be limited to a purely written examination of a topic relevant to the conception and development of computer games. In both cases, there is a close connection to practice. To this end, students must build on the basic principles taught during their studies and independently develop these further in terms of practice and content. The final thesis thus requires the ability

to independently design further learning processes as well as to make well-founded judgements taking into account relevant findings. Finally, the colloquium following the Bachelor's thesis requires that the Bachelor candidates are able to defend their results argumentatively. The competences necessary for this process are specifically trained during the degree program, e.g. by giving papers and preparing presentations.

Subject Areas and Modules

Subject area	General Studies	GD 1.
Module	Scientific Work	GD 1.1

Responsible professor	Prof. Dr. Michael Bhatt	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	1	
Prerequisites	keine	
Teaching form	50% - Lecture // 50% Seminar	
Requirement for the award of ECTS-points		
Type of examination	Written (scientific term paper)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students know and understand</p> <ul style="list-style-type: none"> ▪ the central organs of the university. ▪ the forms and modalities of examinations. ▪ terms and categories of academic sources and associated forms of citation. <p>Students can</p> <ul style="list-style-type: none"> ▪ organize study-relevant processes and tasks. ▪ identify and formulate scientific topics. ▪ plan and structure scientific homework. ▪ discuss scientific content. ▪ research, assess and evaluate scientific sources. ▪ analyze subject-related facts. ▪ formulate definitions of terms and strive for linguistic eloquence.
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	<ul style="list-style-type: none">▪ apply formal guidelines for scientific work.▪ master notation forms for quotations and references.▪ create lists of sources and references.▪ avoid plagiarism.▪ prepare and hold presentations.
Contents	<ol style="list-style-type: none">1. Introduction of the university2. Methodology of scientific work3. Presentation and visualization techniques4. Self- and time management
Recommended reading	<p>Thiele, Albert, Präsentieren Sie einfach: Mit und ohne Medien – Techniken und Strategien für Vorträge unter Zeitdruck, Frankfurter Allgemeine Buch, 1. Aufl. 2007.</p> <p>Boeglin, Martha, Wissenschaftlich arbeiten Schritt für Schritt: Gelassen und effektiv studieren, 2. Aufl. UTB 2012.</p> <p>Pospiech, Ulrike, Wie schreibt man wissenschaftliche Arbeiten? Von der Themenfindung bis zur Abgabe. Für Hausarbeiten, Bachelor- und Masterarbeit, 2. Aufl., Berlin: Dudenverlag, 2017.</p>

Subject area	General Studies	GD 1
Module	Narrative Design I	GD 1.2

Responsible professor	Prof. Dr. Michael Bhatta	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days á 6 Hours
Learning time (h)	82	
Semester	2	
Prerequisites	keine	
Teaching form	50% - Lecture // 30% - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Development of script & storyboard for a short film)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students know and understand</p> <ul style="list-style-type: none"> ▪ dramaturgical models and paradigms of linear storytelling. ▪ the importance of fictional and narrative elements for cross-media content. ▪ the interplay of characters, narrative conflicts and scenarios. ▪ different historical origins and cross-media stylistic developments. <p>Students can</p> <ul style="list-style-type: none"> ▪ analyze existing stories and narrative scenarios. ▪ conceive their own narrative scenarios. ▪ conceive narrative archetypes and characters. ▪ write narrative exposés and treatments (story outlines), scripts with dialogues.
Contents	<ol style="list-style-type: none"> 1. Historical development 2. Dramaturgy and staging 3. Location and character design 4. Formalities for script, storyboard and setting list

	5. Writing and creativity techniques
Recommended reading	<p>Campbell, Joseph, <i>The Hero of a Thousand Faces (1949)</i>, 3. Aufl. New World Library, 2008.</p> <p>Field, Syd, <i>The Screenwriter's Workbook: Exercises and Step-by-Step Instructions for Creating a Successful Screenplay</i> (revised edition), Delta, 2005.</p> <p>McKee, Robert, <i>Story: Style, Structure, Substance, and the Principles of Screenwriting</i>, HarperCollins, 2010.</p> <p>Vogler, Christopher, <i>The Writer's Journey: Mythic Structure for Writers (1992)</i>, Studio City: Michael Wiese Productions, 2007.</p>

Subject area	General Studies	GD 1
Module	Audiovisual Staging	GD 1.3

Responsible professor	Prof. Dr. Michael Bhatt	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days á 6 Hours
Learning time (h)	82	
Semester	4	
Prerequisites	keine	
Teaching form	50% - Lecture // 30% - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product (digital Video Production)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students know and understand</p> <ul style="list-style-type: none"> ▪ the phases of an audiovisual production (pre-production, shooting, post-production), from idea generation to publication (release). ▪ cinematographic staging of camera angles, actors and space (blocking). ▪ monDays and editing techniques. ▪ music, sound and video as means of staging. <p>The students can</p> <ul style="list-style-type: none"> ▪ plan, conceptualize and realize a video production according to a methodical guideline. ▪ sDays a video with sound and music. ▪ sDays motion design for titles and credits or also VFX, if necessary with live action..
Contents	<ol style="list-style-type: none"> 1. Production processes from script to video presentation 2. Distribution of roles of cast & crew

	<ol style="list-style-type: none">3. Camera settings, film editing & monDays4. Sound and music5. Visual effects, compositing & grading6. Basics of digital video and sound technology7. Historical developments and cinematographic concepts
Recommended reading	<p>Monaco, James, How to Read a Film: The World of Movies, Media, Multimedia: Language, History, Theory (1977), Oxford University Press, 2009.</p> <p>Rabiger, Michael, Directing - Film Techniques and Aesthetics (1989), 3. Aufl., Boston: Focal Press, 2013.</p> <p>Schleicher, Harald et al. (Hrsg.), Filme machen: Technik – Gestaltung - Kunst, Frankfurt a.M.: Zweitausendeins-Verlag, 2005</p>

Subject area	General Studies	GD 1
Module	Applied Research	GD 1.4

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	interdisziplinär	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days á 6 Hours
Learning time (h)	82	
Semester	5	
Prerequisites	keine	
Teaching form	50 % - Lecture // 30% - Seminar // 20% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students can</p> <ul style="list-style-type: none"> ▪ evaluate and analyze new technologies or methods. ▪ formulate and justify forecasts for future application possibilities. ▪ practically implement and present concepts or prototypes for new technologies. ▪ apply scientific methods in the context of practical questions.
Contents	The content is practice-oriented and based on current trends. The research aspect of the course is essential here. Therefore, literature is offered in the form of documentation depending on the choice of tools.
Recommended reading	Due to its research character, the literature refers to the contents and will be available very up-to-date, mostly online.

Subject area	General Studies	GD 1
Module	Media Management	GD 1.5

Responsible professor	Prof. Thomas Gronert	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days á 6 Hours
Learning time (h)	82	
Semester	7	
Prerequisites	keine	
Teaching form	50 % - Lecture // 30% - Seminar // 20% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Business Plan)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students are able to,</p> <ul style="list-style-type: none"> ▪ develop business models and write a business plan for them. ▪ evaluate the methods of entrepreneurial decision-making with reference to the numerous instruments of business management in their complementary contexts. ▪ assess and use simple rights declarations. ▪ consider legal issues in the conception and calculation of media projects. ▪ include essential criteria of copyright and related rights in planning and organizational measures for media productions.
Contents	<p>1. Basics</p> <ul style="list-style-type: none"> ▪ Setting up a business ▪ Goal formation and goal systems ▪ Legal form and form of enterprise ▪ Development phases of a company ▪ Investment and financing

	<ol style="list-style-type: none">2. Corporate governance<ul style="list-style-type: none">▪ Fundamentals of corporate management▪ Strategic corporate management▪ Corporate organisation▪ Controlling as a management tool▪ Human resource management▪ Quality management3. The most important legal issues<ul style="list-style-type: none">▪ Copyright and publishing law▪ Intellectual property law▪ Domain law4. Other relevant rights for media productions
Recommended reading	<p>Nagl Anna (2013): Der Businessplan: Geschäftspläne professionell erstellen. Mit Checklisten und Fallbeispielen; Springer Gabler; Auflage: 7., überarb. Aufl. 2014</p> <p>Dillerup R., Stoi R.: Unternehmensführung; Vahlen; Auflage: 4., komplett überarbeitete und erweiterte Auflage 2013</p> <p>Peter Bühler, Patrick Schlaich, Dominik Sinner Medienrecht: Urheberrecht – Markenrecht – Internetrecht (Bibliothek der Mediengestaltung), 2018:</p> <p>Fechner Frank: Medienrecht: Lehrbuch des gesamten Medienrechts unter besonderer Berücksichtigung von Presse, Rundfunk und Multimedia; UTB GmbH; Auflage: 17 2016</p>

Subject area	Game Design	GD 2
Module	Game Design I: Conception	GD 2.1

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B.8 Days á 6 Hours
Learning time (h)	82	
Semester	1	
Prerequisites	keine	
Teaching form	30% - Lecture // 20% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Term paper, e.g. Pitching Doc)	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>The students know and understand</p> <ul style="list-style-type: none"> ▪ structural characteristics of digital and non-digital games. ▪ connections between game rules, game mechanics and player experience. ▪ relevant framework conditions for the conception of computer games such as platform, target group, business model. ▪ the different roles in a game production and the corresponding job descriptions. ▪ the production process of a game production. <p>Students can</p> <ul style="list-style-type: none"> ▪ analyze game rules and game mechanics. ▪ design game rules and game mechanics. ▪ elaborate game ideas and present them in a pitch.
Contents	<ol style="list-style-type: none"> 1. Definitions of terms, e.g. rules of the game, mechanics of the game 2. Historical overview, e.g. platforms

	<p>3. Overview of the games industry, including</p> <ul style="list-style-type: none">▪ Business models▪ Job descriptions <p>4. Pitching</p>
Recommended reading	<p>Robin Hunicke et al.: MDA: A Formal Approach to Game Design and Game Research, CiteSeerX 10.1.1.79.4561</p> <p>Tracy Fullerton: Game Design Workshop: A Playcentric Approach to Creating Innovative Games. 4. Auflage. AK Peters/CRC Press, 2018.</p> <p>Jesse Schell: The Art of Game Design: A Book of Lenses. 3. Auflage. Taylor & Francis, 2019.</p> <p>Tynan Sylvester: Designing Games: A Guide to Engineering Experiences. O'Reilly, 2013</p>

Subject area	Game Design	GD 2
Module	Game Design II: Documentation and Production	GD 2.2

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days á 6 Hours
Learning time (h)	82	
Semester	2	
Prerequisites		
Teaching form	30% - Lecture // 20% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Term paper, e.g. Game Design Document or Project outline)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students can plan a project and create the documents necessary for production.</p> <p>The students know and understand</p> <ul style="list-style-type: none"> ▪ common genres in the field of digital games. ▪ production-relevant document types, e.g. Game Design Document, Art Bible, Technical Design Document. ▪ aspects of project management relevant for project implementation as well as corresponding process models <p>Students can</p> <ul style="list-style-type: none"> ▪ analyze and categorize computer games. ▪ plan a project and prepare for its implementation. ▪ create and manage production documents.
Contents	<ol style="list-style-type: none"> 1. Genres 2. Documentation 3. Project planning, management and control

	4. Classical and agile project management
Recommended reading	Dan Irish: The Game Producer's Handbook. Cengage Learning, 2005. Richard Rouse: Game Design: Theory & Practice. Wordware Game Developer's Library, 2004. Wendy Despain (Hrsg.): Professional Techniques for Video Game Writing. Taylor & Francis, 2008

Subject area	Game Design	GD 2
Module	Game Design III: Interaction Design	GD 2.3

Responsible professor	Prof. Uke Bosse	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days 6 Hours
Learning time (h)	82	
Semester	3	
Prerequisites		
Teaching form	30% - Lecture // 20% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students know and understand</p> <ul style="list-style-type: none"> ▪ basics of human-machine interaction ▪ basics of player guidance ▪ basics of UX design ▪ basics of gamification ▪ media didactic and psychological aspects in the game context <p>Students are able to</p> <ul style="list-style-type: none"> ▪ analyze, design and visually implement user interfaces. ▪ analyze games in terms of their game mechanics, dynamics and systems and design them themselves.
Contents	<ol style="list-style-type: none"> 1. Human-machine interaction 2. Basics of graphical user interfaces (GUIs) in computer games 3. Dynamics and systems 4. Basics of UX design

Recommended reading	<p>Brent Fox: Game Interface Design, Cengage Learning.</p> <p>Kevin Saunders und Jeannie Novak. Game Development Essentials – Game Interface Design. Thomson Learning.</p> <p>Alan Cooper und Robert Reimann: About Face 3.0: The Essentials of Interaction Design. Wiley & Sons.</p> <p>Don Norman: The Design of Everyday Things. Basic Books</p> <p>Erik Zimmerman, Katien Salen. Rules of Play. MIT Press</p> <p>Nir Eyal: Hooked - How to build Habitforming Products. Portfolio Penguin</p> <p>Zack Hiwiler: Players Making Decisions. Game Design Essentials and the Art of Understanding your Players. New Riders</p>
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Subject area	Game Design	GD 2
Module	Narrative Design II: Interactive Storytelling	GD 2.4

Responsible professor	Prof. Dr. Michael Bhatt	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days á 6 Hours
Learning time (h)	82	
Semester	3	
Prerequisites	keine	
Teaching form	40% - Lecture // 40% - Seminar // 20 - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Narrative Design Document)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students know and understand</p> <ul style="list-style-type: none"> ▪ paradigms for structuring interactive narratives. ▪ dramaturgical methods of staging stories in videogames. <p>Students are able to</p> <ul style="list-style-type: none"> ▪ identify and evaluate similarities and differences in narrative methods for computer games and classic media. ▪ analyze case studies with regard to their narrative and semantic aspects. ▪ conceive their own interactive narratives and/or narrativized elements. ▪ apply dramaturgical means and methods of staging to their own video games in development. ▪ write dialogue and texts for games (applied game writing). ▪ identify ludonarrative dissonances of game mechanics, rule systems and intended narration and avoid them by methodical conception.
Contents	1. Interactive storytelling

	<ol style="list-style-type: none">2. Applied world and character design3. Synergy of game mechanics and narration4. Ludonarrative dissonance
Recommended reading	<p>Bhatty, Michael, Interaktives Story Telling: Zur historischen Entwicklung und konzeptuellen Strukturierung interaktiver Geschichten, Shaker Verlag, 1999.</p> <p>Despain, Wendy (Ed.), Professional Techniques for Video Game Writing, Taylor & Francis, 2008.</p> <p>Glassner, Andrew, Interactive Storytelling, AK Peters, Natick, 2004.</p> <p>Heussner, Tobias et al., The Game Narrative Toolbox. Focal Press, 2015.</p> <p>Rusch, Doris, Making Deep Games: Designing Games with Meaning and Purpose, Taylor & Francis, 2016.</p> <p>Sheldon, Lee, Character Development and Storytelling for Games, Premier Press, 2004.</p>

Subject area	Game Design	GD 2
Module	Game Design IV: Level Design and Game Guidance	GD 2.5

Responsible professor	Prof. Uke Bosse	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	4	
Prerequisites		
Teaching form	40% - Lecture // 40% - Seminar // 20 - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students know and understand dramaturgical, aesthetic and technical aspects of level design.</p> <p>They are able to analyze</p> <ul style="list-style-type: none"> ▪ games from different genres with regard to level design. ▪ conceive their own game content for different genres and implement it in a game engine. ▪ outline workflows for the production.
Contents	<ol style="list-style-type: none"> 1. Level design and content design 2. Analysis of case studies 3. Conception of game content
Recommended reading	<p>Phil Co, Level Design for Games. Creating Compelling Game Experiences. New Riders, Auflage: Pap/Cdr (2006).</p> <p>John Harold Feil und Marc Scattergood. Beginning Game Level Design. (Premier Press Game Development). Thomson Learning, Auflage: Pap/Cdr (2005).</p>

	<p>Kremers: Level Design: Concept, Theory, and Practice. AK Peters / CRC Press, 2009.</p> <p>Christopher Totten: An Architectural Approach to Level Design. AK Peters, 2014.</p> <p>Christopher Totten (Hrsg.): Level Design: Processes and Experiences. AK Peters / CRC Press, 2017.</p>
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Subject area	Game Design	GD 2
Module	Game Design V: Process Management	GD 2.6

Responsible professor	Prof. Dr. Michael Bhatt	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	5	
Prerequisites	keine	
Teaching form	40% - Lecture // 40% - Seminar // 20 - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Term paper)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students know and understand</p> <ul style="list-style-type: none"> ▪ the challenges in chaotic-creative productions, consisting of the desired quality, the time available and the budget, as well as the human factor in media productions. ▪ disruptive factors in media productions. ▪ the difference between quality assurance and testing. ▪ the market and development requirements for localization. <p>Students are able to</p> <ul style="list-style-type: none"> ▪ define, monitor and manage target and performance requirements for assets, teams and tasks. ▪ identify and evaluate parameters of media immersion of a media product in development. ▪ derive agile and iterative redesign processes in case of failure. ▪ create and evaluate formulas to check parameters and values to be balanced. ▪ define and initiate measures to achieve the objectives.
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Contents	<ol style="list-style-type: none">1. Iterative Design / Redesign Process2. Producing & Directing3. Quality Assurance, Testing & Balancing4. Localization
Recommended reading	<p>Irish, Dan: Game Producer's Handbook, Cengage Learning PTR, 2005.</p> <p>Spaulding, Seth: Team Leadership in the Game Industry, Cengage Learning PTR, 2009.</p> <p>Brooks Jr, Frederick P.: The Mythical Man-Month, Addison-Wesley Professional, 1995.</p> <p>McConnell, Steve: Rapid Development: Taming Wild Software Schedules, Microsoft Press, 1996.</p> <p>McConnell, Steve: Software Project Survival Guide, Microsoft Press, 1996</p>

Subject area	Game Design	GD 2
Module	Experimental Research	GD 2.7

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	4
Semester	7	
Prerequisites		
Teaching form	40% - Lecture // 40% - Seminar // 20 - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written (Term paper)	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>The students deal with questions that go beyond the core area of game development and with corresponding research topics.</p> <p>The students know and understand</p> <ul style="list-style-type: none"> ▪ current focal points of Game Studies. ▪ possible applications of game design outside the computer games industry. <p>The students can</p> <ul style="list-style-type: none"> ▪ apply game design methods to non-digital games. ▪ name possible applications of their practical expertise in the context of scientific research. ▪ connect scientific work with practical questions.
Contents	The content is oriented towards current trends in the computer games industry or game studies.
Recommended reading	The literature refers to the thematic content and is selected accordingly.

Subject area	Basics Art	GD 3
Module	Basics Game Art I: Visualization Processes	GD 3.1

Responsible professor	Prof. Henning Janssen	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	1	
Prerequisites	keine	
Teaching form	50% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students are able to</p> <ul style="list-style-type: none"> ▪ conceptualize figures and forms and realize them with visual means. ▪ apply the basic drawing techniques (i.e. representation in perspective, light and shadow). ▪ select and implement representation techniques for the presentation of their own creative ideas. ▪ distinguish drawing styles and to name differences. ▪ distinguish basic cultural-historical epochs and identify anachronisms.
Contents	<ol style="list-style-type: none"> 1. Drawing techniques (line, hatching) 2. Perspective, form, space, light, shadow 3. Basics of anatomy and proportion of the human body 4. Drawing from nature 5. Harmonious image composition

	6. Introduction to conceptual design
Recommended reading	<p>Robertson, Scott: How to Draw: Drawing and Sketching Objects and Environments (Englisch), Design Studio Press, 2013</p> <p>Cole, Rex Vicat: Perspective for Artists (Dover Art Instruction) (Englisch), Dover Publications Inc.; Auflage: New ed., 1976</p> <p>Bammes, Gottfried: Die Gestalt des Menschen: Lehr- und Handbuch der Künstleranatomie, Christophorus Verlag; 4. Auflage, 2009</p> <p>Watson, Ernest W.: Creative Perspective for Artists and Illustrators (Dover Art Instruction), Dover Publications, 2012</p> <p>Ching, Francis D. K., Juroszek, Steven P.: Design Drawing (Englisch), Wiley; 2. Auflage, 2010</p> <p>Edwards, Betty: Drawing on the right side of the brain, Tarcher Perigee, 2012</p>

Subject area	Basics Art	GD 3
Module	Basics Game Art II: Asset Design I	GD 3.2

Responsible professor	Prof. Don-Oliver Matthies	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	1	
Prerequisites	keine	
Teaching form	50% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ recognize trends for new technologies. ▪ analyze stylistics. ▪ recognize design features in the 3D field in relation to technical restrictions of a real-time environment. <p>Students can</p> <ul style="list-style-type: none"> ▪ identify, evaluate, and analyze graphical trends. ▪ create and maintain low polygonal 3D objects optimized for a real-time environment..
Contents	<ol style="list-style-type: none"> 1. Examination of the design in space according to conceptual guidelines. 2. Real-time applications and technical restrictions 3. Basics of 2D and 3D texturing 4. Analysis of stylistic means 5. Basics of PBR rendering.

Recommended reading	Plowman, Justin: 3D Game Design with Unreal Engine 4 and Blender, 2016 Lewrick, Michael: Design Thinking Playbook: Mit traditionellen, aktuellen und zukünftigen Erfolgsfaktoren, 2017 Totten, Christopher W.: An Architectural Approach to Level Design, 2014
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Subject area	Basics Game Engineering	GD 4
Module	Mathematics I	GD 4.1

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	1	
Prerequisites	keine	
Teaching form	50 % - Lecture // 30% - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	Students understand the mathematical concepts essential to computer game development. They are able to apply them in the context of game development.
Contents	<ol style="list-style-type: none"> 1. Propositional logic 2. Elementary algebra (numbers and arithmetic operations, term transformation, number systems, sets, tuples, sums, products) 3. Basics of linear algebra (vectors, matrices, systems of equations) 4. Complex numbers & quaternions 5. Basics of trigonometry 6. Differential calculus 7. Combinatorics (& probability) 8. Formal languages and automata
Recommended reading	Courant & Robbins: Was ist Mathematik? Springer-Verlag, 2001

	<p>Dunn, Parberry: 3D Math Primer for Graphics and Game Development, CRC Press, 2011</p> <p>Tremblay: Mathematics for Game-Developers Course Technology, 2004</p> <p>Schöning: Theoretische Informatik - kurzgefasst, Spektrum Akademischer Verlag, 2008</p>
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Subject area	Basics Game Engineering	GD 4
Module	Programming I	GD 4.2

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	1	
Prerequisites		
Teaching form	50 % - Lecture // 30% - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	The students understand the basics of (object-oriented) programming and are able to develop simple programs themselves.
Contents	<ol style="list-style-type: none"> 1. Game loop 2. Load & render 3. Variables 4. Conditions 5. Input 6. Logical operators 7. Functions 8. Data types 9. Loops 10. Classes 11. Arrays

	12. Enums & switch case 13. Constructors 14. Value vs Reference Types
Recommended reading	Bartmann, Erik: Processing, 2010 Sweigart, Al: Eigene Spiele Programmieren – Python lernen: Der spielerische Weg zu Programmiersprache, 2017

Subject area	In-Depth Art	GD 5
Module	Concept Art I: Staging	GD 5.1

Responsible professor	Prof. Don-Oliver Matthies	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	2	
Prerequisites		
Teaching form	50 % - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students are able to design concepts from the imagination based on research methods and using reference material as part of industry design processes in individual or group work.</p> <p>The lecture will take place in an interdisciplinary discourse with special consideration of game design relevant conditions for design.</p> <p>The focus of this series is the design of figure in space.</p>
Contents	<ol style="list-style-type: none"> 1. In-depth study of human anatomy 2. Mood board as research result and basis for conceptual design processes 3. Storyboard 4. Visual storytelling 5. Influences of art-historical epochs and the analysis of fictional scenarios (e.g. SciFi, Fantasy) 6. Design for different target groups and current market developments

Recommended reading	Le, Kang: The skillfull huntsman, Design Studio Press, 2005 Joseph, Christopher; Anatomie: Illustriert mit den Original-Zeichnungen aus Gray's Anatomy, Kopp Verlag, 2013 Loomis, Andrew: Figure Drawing for All It's Worth (Englisch), Titan Books, 2011
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Subject area	In-Depth Art	GD 5
Module	Game Asset Production I: 3D-Construction Techniques	GD 5.2

Responsible professor	Prof. Thomas Vogel	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	2	
Prerequisites		
Teaching form	50 % - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ apply the practical procedures for geometric modeling (polygon modeling, digital sculpturing). ▪ work out strategies for the implementation of detailed models via the separation of depth information from high to low polygonal objects (normal/displacement mapping). ▪ apply textures for the dynamic calculation of light and shadow. ▪ integrate different forms of 3D objects into a 3D graphics engine. ▪ work on the complexity of larger productions in an orderly manner and with adequate time estimation. ▪ work out the formal structure of three-dimensional scenes with interactive design tools.
Contents	<ol style="list-style-type: none"> 1. Highpoly design techniques 2. Introduction to animation static hard surface 3. Basics of VFX design

	<p>4. Retopologization</p> <p>5. Basics Engine Workflows -Pipeline Organization: technical as well as artificial differences.</p>
Recommended reading	<p>3D Total Publishing, Beginner's Guide to Sculpting Characters in Clay, 2017</p> <p>Arnold, Janet: Patterns of Fashion: The Cut and Construction of Cloth, 2008</p> <p>Williams, Richard E.: The Animator's Survival Kit, 2001</p> <p>Hawkins, Ryan: Vertex 3, 2011</p> <p>Prof. Purdue, Sham Tickoo: Pixologic ZBrush 2018: A Comprehensive Guide, 5th Edition, 2018</p> <p>Finch, Andrew: The Unreal Game Engine: A Comprehensive Guide to Creating Playable Levels (Englisch), 2014</p>

Subject area	In-Depth Art	GD 5
Module	Concept Art II: Character & Creature Design	GD 5.3

Responsible professor	Prof. Don-Oliver Matthies	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	3	
Prerequisites		
Teaching form	50% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ name and analyze real animals, as well as animals and hybrid creatures from different myths and cultures. ▪ create anatomically correct representations of real animals. ▪ conceptualize and design alienated and newly created animals or mixed creatures.
Contents	<ol style="list-style-type: none"> 1. Anatomical studies of different animal species 2. Analysis of mythical creatures in art-historical contexts of different epochs and cultures 3. Studies of animal-myth-creature-human interaction (example: mount)
Recommended reading	<p>Bammes, Gottfried: Große Tieranatomie, Kosmos Verlag, 2010</p> <p>Tank, Wilhelm: Tieranatomie für Künstler, Ravenburger, 1989</p> <p>Gurney, James: Imaginative Realism: How to Paint What Doesn't Exist, Andrews McMeel Publishing, 2009</p>

Subject area	In-Depth Art	GD 5
Module	Game Asset Production II: Production Pipeline	GD 5.4

Responsible professor	Prof. Thomas Vogel	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	3	
Prerequisites		
Teaching form	50% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ segment complex surface descriptions and incorporate them in a gameplay-related manner. ▪ work out strategies for procedural creation of textures with generators and masks. ▪ apply practical procedures for figure design based on the human skeleton. ▪ apply the principles of animation art and animate a 3D object using a variety of techniques. ▪ create dynamic gameplay-related VFX (visual effects). ▪ apply a variety of techniques to create terrain and tileable textures for the creation of a prototype.
Contents	<ol style="list-style-type: none"> 1. Deepening VFX 2. Texturing continuation PBR - procedural 3. Level design modularity, physical mapping of fragmentation – real time fractures

	<ol style="list-style-type: none">4. Realization concepts for prototype design5. Skeletal rigging & animation
Recommended reading	<p>Tom Shannon, Unreal Engine 4 for Design Visualization: Developing Stunning Interactive Visualizations, Animations, and Renderings, 2017</p> <p>Susan Zwerman/Jeffrey A Okun, The VES Handbook of Visual Effects. Industry Standard and VFX Paractices, 2014</p>

Subject area	In-Depth Art	GD 5
Module	Concept Art III: Environment Design	GD 5.5

Responsible professor	Prof. Henning Janssen	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	4	
Prerequisites		
Teaching form	50% - Seminar // 50% - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students will be able to</p> <ul style="list-style-type: none"> ▪ both categorize and define environments from geological, biological, and architectural perspectives. ▪ apply fundamental structural properties in game environments. ▪ translate settings into clear construction drawings and integrate lighting and weathering effects into the rendering.
Contents	Conception of worlds and geological, organic and architectural play environment.
Recommended reading	<p>Koch, Wilfried, Baustilkunde: Das Standardwerk zur europäischen Baukunst von der Antike bis zur Gegenwart, wissenmedia; 31. Aufl. (2013)</p> <p>Ching, Francis D. K., Architecture: Form, Space, and Order, Wiley; 4. Aufl. (2014)</p> <p>Gurney, James, Color and Light: A Guide for the Realist Painter, Andrews McMeel Publishing (2010)</p>

Subject area	In-Depth Art	GD 5
Module	Game Asset Production III: World & Environment Design	GD 5.6

Responsible professor	Prof. Thomas Vogel	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	4	
Prerequisites		
Teaching form	50 % - Seminar // 50 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ sDays a complex game environment using concept and construction drawings. ▪ use light, shadow and color to create an atmospheric overall composition. ▪ differentiate the world design skills involved in the work cycles. ▪ produce an animated polygon structure for real-time 3D visualizations. ▪ use global illumination techniques for improvements in surface representation in real-time applications..
Contents	<ol style="list-style-type: none"> 1. Procedural design techniques 2. Dramaturgy, cinematization and audiovisual staging 3. Reusability - modularity 4. Classification of biomes world building 5. VFX design - flocking systems

Recommended reading	<p>Alex Galuzin, Preproduction Blueprint: How to Plan Game Environments and Level Designs, 2016</p> <p>Tanya X Short, Tran Adams, Procedural Generation in Game Design, 2017</p> <p>Charles Darwin/George Levine, The Origin of Species (Barnes & Noble Classic), 2003</p> <p>Christi Friesen, Flourish Book 1 Flora: Leaf, Flower, and Plant Designs, 2013</p>
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Subject area	In-Depth Art	GD 5
Module	Concept Art IV: Asset Design	GD 5.7

Responsible professor	Prof. Don Oliver Matthies	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	5	
Prerequisites		
Teaching form	50 % - Seminar // 50 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students are able to</p> <ul style="list-style-type: none"> ▪ analyze the form and function of real vehicles, machines, weapons and tools from different eras and cultures. ▪ research and classify assets in games according to their relevance in an artistic and economic context. ▪ conceptualize and implement their own designs based on analysis and research using industry-related processes in individual and group work.
Contents	<ol style="list-style-type: none"> 1. Development/deepening of analysis tools in the art field, focus on visual analysis 2. Exercises in in-depth research and its documentation as part of team-based design processes 3. Creation of concepts in an industry-oriented art pipeline 4. Portfolio staging incl. online presentation
Recommended reading	<p>Chiang, Chiang; Mechanika: Creating the Art of Science Fiction, Verlag F&W (2008) Robertson, Scott; How to render, Design Studio Press (2014)</p>

	McCloud, Scott; Understanding Comics, William Morrow Paperbacks (1994)
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Subject area	In-Depth Art	GD 5
Module	Game Asset Production IV: Morphological Staging	GD 5.8

Responsible professor	Prof. Thomas Vogel	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	5	
Prerequisites		
Teaching form	50 % - Seminar // 50 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ transfer the characteristics of human anatomy to the animal world. ▪ transfer the craftsmanship of the analog sculptor to the digital age. ▪ represent different forms of land creatures in skeletal form. ▪ create a costume design in different forms of representation: Fantasy, fashion design, historically accurate armor design. ▪ analyze the muscle system in the human face and depict it as a skeleton according to F.A.C.T.S. ▪ create complex and combined animations and safely master character animations.
Contents	<ol style="list-style-type: none"> 1. Organic life forms: Humanoid fauna and creatures. 2. Fashion design 3D scanning - digital patterns Marvelous. 3. Creation of complex dynamic materials (skin, ice) 4. Portfolio staging

	5. Quadroped rigging
Recommended reading	<p>Paul Ekman/ Erika Rosenberg, What the Face Reveals: Basic and Applied Studies of Spontaneous Expression Using the Facial Action Coding System (FACS) (Series in Affective Science, Oxford University Press; 2. Auflage 2014</p> <p>Eyal Assaf, Rigging for Games: A Primer for Technical Artists Using Maya and Python; 2015</p> <p>Andrew Gahan, 3ds Max Modeling for Games: Insider's Guide to Game Character, Vehicle, and Environment Modeling, Elsevier Science; 2008.</p> <p>Richard E. Williams, The Animator's Survival Kit; 2001</p> <p>Gottfried Bammes, The Complete Guide to Anatomy for Artists & Illustrators , Search Press; 2017</p>

Subject area	In-Depth Game Engineering	GD 6
Module	Computer Science I	GD 6.1

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	8 Days à 6 Hours
Learning time (h)	82	
Semester	2	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students know and understand the subject of computer science and its contents as distinct from mathematics and programming.</p> <p>The students are able to abstract problems and develop generally valid solutions, as well as to perform runtime analyses for algorithms.</p>
Contents	<ol style="list-style-type: none"> 1. Abstraction and formalization of problems 2. Graph notation and algorithms (e.g. BFS, DFS, A*, Dijkstra) 3. Runtime analysis and O-notation 4. Other algorithms (e.g. sorting methods)
Recommended reading	<p>Manfred Nitzsche – Graphen für Einsteiger: Rund um das Haus vom Nikolaus, 2009</p> <p>Heinrich Müller – Vorkurs Informatik: Der Einstieg ins Informatikstudium, 2017</p> <p>Rainer Hattenhauer – Informatik für Schule und Ausbildung, 2010</p>

Subject area	In-Depth Game Engineering	GD 6
Module	Programming II	GD 6.2

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	2	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students deepen their insight into object-oriented programming and learn further elements of programming.</p> <p>The students are able to read and write complex code and have the necessary basics to continue their learning process in the area of programming themselves.</p>
Contents	<ol style="list-style-type: none"> 1. Statics 2. Name spaces 3. Access modifiers 4. Data structures: dynamic array, queue, stack, linked list 5. Templates/Generics 6. Inheritance 7. Memory management: stack, heap, garbage collector, destructor 8. Exceptions and Assertions 9. Delegates

Recommended reading	Jared Halpern, Developing 2D Games with Unity: Independent Game Programming with C#, 2018 Joseph Albahari, Ben Albahari: C# 7.0 – kurz & gut, 2018
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Subject area	In-Depth Game Engineering	GD 6
Module	Software Engineering	GD 6.3

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	3	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	The students understand the principle of decoupling software based on different design patterns. They are able to design their code in a way that simplifies the architecture, the reuse & maintenance of the code.
Contents	<ol style="list-style-type: none"> 1. Software Design Patterns 2. Advanced programming techniques (closures, delegates, higher-order programming, etc.) 3. Software testing 4. Code analysis & refactoring
Recommended reading	<p>Erich Gamma, Richard Helm, Ralph E. Johnson, John Vlissides: Entwurfsmuster. Elemente wiederverwendbarer objektorientierter Software</p> <p>Robert Nystrom: Game Programming Patterns</p> <p>Martin, Robert: Clean Code - A Handbook of Agile Software Craftsmanship, 2013.</p>

	Michael Bonancina: C++ Programmieren für Einsteiger: Der leichte Weg zum C++ Experten, 2018
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Subject area	In-Depth Game Engineering	GD 6
Module	Graphic Programming	GD 6.4

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	3	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>Students understand the concept of computing or rendering images of three-dimensional virtual objects in real time in relation to computer games using current hardware (graphics cards), software (graphics libraries), architectures (render pipeline), and techniques (e.g., rasterization vs. ray tracing).</p> <p>Students are able to</p> <ul style="list-style-type: none"> ▪ implement interactive graphical applications (even without an underlying game engine). ▪ implement their own fragment and vertex shaders.
Contents	<ol style="list-style-type: none"> 1. Theoretical basics of computer graphics and introduction to the functionality of the graphics pipeline 2. Object representation: e.g. 3d meshes (CSG, Implicit Surfaces). 3. Transformation and projection (homogeneous 4x4 matrices) 4. Vertex shader, fragment shader 5. Illumination (Blinn-Phong) and shading (Stencil-Buffer)

	<ol style="list-style-type: none">6. Rasterization7. Texturing (barycentric coordinates, bilinear interpolation, mip maps, texture compression)8. Normal maps, PBR9. Structure of image formats10. Posteffects, filters (e.g. edge detection, smoothing, FFT)11. Splines & Interpolation
Recommended reading	<p>Lengyel, Eric, Mathematics for 3D Game Programming and Computer Graphics, Cengage Learning (2011)</p> <p>Foley & van Dam, Computer Graphics: Principles and Practice, Addison Wesley (1997)</p> <p>Bailey & Cunningham, Graphics Shaders - Theory And Practice, CRC Press (2012)</p>

Subject area	In-Depth Game Engineering	GD 6
Module	Computer Science II	GD 6.5

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	4	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Written	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	Students achieve a deeper understanding of computer science. They are able to perform correctness proofs for algorithms, to determine the runtime of recursive algorithms and to select algorithms and data structures in such a way that optimal runtimes result for the given problem.
Contents	<ol style="list-style-type: none"> 1. Dynamic data structures & sorting algorithms <ul style="list-style-type: none"> ▪ Implementation ▪ Runtime behavior 2. Techniques for designing efficient algorithms <ul style="list-style-type: none"> ▪ Runtime determinations (e.g. master theorem) ▪ Formal verification (correctness & scheduling) ▪ Problem solving strategies 3. Tool development & user interfaces <ul style="list-style-type: none"> ▪ UI Frameworks 4. Concepts & workflows

Recommended reading	Charles E. Leiserson, Clifford Stein, Ronald L. Rivest und Thomas H. Cormen : Algorithmen - Eine Einführung, 2013
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Subject area	In-Depth Game Engineering	GD 6
Module	Game KI	GD 6.6

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	4	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Medienprodukt	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Students understand the role of artificial intelligence in computer games (as distinct from general artificial intelligence), know the relevant procedures and methods, and can apply them to develop bots or NPCs for (both single- and multiplayer) computer games.</p> <p>The students understand relevant algorithms for procedural synthesis, know their application possibilities and limits and can implement systems for the synthesis of procedural content (with or without an engine).</p>
Contents	<ol style="list-style-type: none"> 1. Topic classification 2. AI architecture (agents) 3. State-based behavior control (finite automata, behavior trees, MinMax) 4. Simple decisions under uncertainty (fuzzy logic) 5. Learning systems (reinforced learning, evolutionary algorithms, neural networks) 6. Motion control and path planning 7. Procedural synthesis (e.g. L-systems, midpoint displacement, Perlin noise)

Recommended reading	Yannakakis & Togelius, Artificial Intelligence and Games, Springer Verlag (2018) Shaker, Togelius, Nelson, Procedural Content Generation in Games, Springer Verlag (2016) Ebert, Musgrave, Peachey, Perlin, Worley: Texturing and Modeling - A Procedural Approach, Morgan Kaufmann (2003)
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Subject area	In-Depth Game Engineering	GD 6
Module	Backend-Development	GD 6.7

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	5	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The students learn to optimize the workflow in computer game development by means of targeted use of existing or self-developed tools.</p> <p>Students are able to develop network-compatible games with a client-server structure (using an engine or, in the case of a dedicated server, without one) and optimize them using multithreading.</p> <p>The students understand the basic aspects of data management and exchange for complex games, both within the game and in interaction with external tools and services.</p>
Contents	<ol style="list-style-type: none"> 1. Basics of backend architectures (e.g. input, databases) 2. Networking (client-server architecture) 3. Customizing or extending game engines and workflows (with or without using or developing external tools) 4. Connection or embedding of script languages (e.g. Python, Lua or similar) 5. Multithreading

Recommended reading	Kemper & Eickler, Datenbanksysteme, Eine Einführung, Oldenbourg (2001) Tanenbaum, Computer Networks, Pearson (2011)
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Subject area	In-Depth Game Engineering	GD 6
Module	Game Physics	GD 6.8

Responsible professor	Prof. Dr. Christoph Minnameier	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	5	
Total time (h)	130	
Teaching time (h)	48	z. B. 8 Days à 6 Hours
Learning time (h)	82	
Semester	5	
Prerequisites		
Teaching form	50 % - Lecture // 30 % - Seminar // 20 % - Practice	
Requirement for the award of ECTS-points		
Type of examination	Media Product	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>Students understand the physical laws required to simulate a virtual game world, their interaction with defined game rules and the limits of the simulation (in terms of performance and stability).</p> <p>Students are able to implement simple simulations (based on Newtonian mechanics) and to use the physics simulation provided by engines to adapt them to the desired game rules..</p>
Contents	<ol style="list-style-type: none"> 1. Subject classification 2. (2D Rigidbody Physics (Separate Axis Theorem)) 3. Collisions (elastic and plastic impact) 4. Particles & Euler method 5. Forces (e.g. gravity, air resistance) 6. Mass-spring models 7. Rigid body dynamics 8. Rigid body kinematics

	<ul style="list-style-type: none">9. Trajectories calculation10. Spatial index data structures (e.g. octrees)11. Learning systems (reinforced learning, evolutionary algorithms, neural networks)12. Motion control and path planning13. Procedural synthesis (e.g. L-systems, midpoint displacement, Perlin noise)
Recommended reading	<p>Feynman Lectures on Physics, Band 1, Basic Books (2009)</p> <p>Eberly, Game Physics, CRC Press (2010)</p> <p>Ericson, Real-Time Collision Detection, Morgan Kaufmann (2004)</p> <p>Milington, Game Physics Engine Development, Elsevier Science (2007)</p> <p>Kodicek, Mathematics & Physics for Programmers, Cengage Learning (2005)</p>

Subject area	Projects	GD 7
Module	Project I	GD 7.1

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	10	
Total time (h)	260	
Teaching time (h)	96	z. B. 16 Days à 6 Hours
Learning time (h)	164	
Semester	2	
Prerequisites		
Teaching form	100 % Project work	
Requirement for the award of ECTS-points		
Type of examination	Project work	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>The first project work serves to prepare the students for the interdisciplinary collaboration of a game production. The focus in the first project takes into account the lack of practical knowledge in the areas of design, art and programming and is therefore on planning and team organization.</p> <p>The students know and understand different roles in the game production</p> <p>Students can</p> <ul style="list-style-type: none"> ▪ pitch projects ▪ plan projects ▪ define milestones ▪ define roles within their team ▪ implement a project using a modern game engine ▪ reflect work results and workflows
Contents	<ol style="list-style-type: none"> 1. Project pitch 2. Team building and role definitions

	<ol style="list-style-type: none">3. Milestones4. Process organization5. Production preparation6. Production
Recommended reading	Literature recommendations will be made depending on the project.

Subject area	Projects	GD 7
Module	Project II	GD 7.2

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	10	
Total time (h)	260	
Teaching time (h)	96	z. B. 16 Days à 6 Hours
Learning time (h)	164	
Semester	3	
Prerequisites		
Teaching form	100 % Project work	
Requirement for the award of ECTS-points		
Type of examination	Project work	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The second project work serves to train the students in the interdisciplinary collaboration of a game production by focusing more on specific roles. The focus is on developing practical knowledge in the areas of design, art and programming.</p> <p>Students know and understand interdisciplinary relationships in the context of the specific project.</p> <p>Students can</p> <ul style="list-style-type: none"> ▪ discuss and specify work processes in a team. ▪ take responsibility for their own work results in the respective area. ▪ implement a project with a modern game engine. ▪ reflect on work results and workflows.
Contents	<ol style="list-style-type: none"> 1. Project pitch 2. Team building and role definitions 3. Milestones 4. Process organization

	5. Production preparation 6. Production
Recommended reading	Literature recommendations will be made depending on the project.

Subject area	Projects	GD 7
Module	Project III	GD 7.3

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	10	
Total time (h)	260	
Teaching time (h)	96	z. B. 16 Days à 6 Hours
Learning time (h)	164	
Semester	4	
Prerequisites		
Teaching form	100 % Project work	
Requirement for the award of ECTS-points		
Type of examination	Project work	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>The third project work serves to professionalize interdisciplinary cooperation of the students. Accordingly, the expectations for the complexity of the project increase. The focus is on further deepening practical knowledge in the areas of design, art and programming.</p> <p>The students know and understand interdisciplinary connections in the context of the concrete project.</p> <p>Students can</p> <ul style="list-style-type: none"> ▪ optimize workflows in a team. ▪ realistically assess knowledge in the areas of design, art and programming and expand it if necessary ▪ implement a project with a modern game engine. ▪ reflect on work results and workflows.
Contents	<ol style="list-style-type: none"> 1. Project pitch 2. Team building and role definitions

	<ol style="list-style-type: none">3. Milestones4. Process organization5. Production preparation6. Production
Recommended reading	Literature recommendations will be made depending on the project.

Subject area	Projects	GD 7
Module	Project IV	GD 7.4

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	10	
Total time (h)	260	
Teaching time (h)	96	z. B. 16 Days à 6 Hours
Learning time (h)	164	
Semester	5	
Prerequisites		
Teaching form	100 % Project work	
Requirement for the award of ECTS-points		
Type of examination	Project work	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The fourth project work strives for professional standards in the planning, preparation and execution of the production. The focus is on aligning practical knowledge in the areas of design, art and programming with the requirements for entering the profession. Students know and understand interdisciplinary relationships in the context of the specific project.</p> <p>Students are able to</p> <ul style="list-style-type: none"> ▪ compare team workflows with professional standards. ▪ implement a project with a modern game engine. ▪ reflect on work results and workflows.
Contents	<ol style="list-style-type: none"> 1. Project pitch 2. Team building and role definitions 3. Milestones 4. Process organization 5. Production preparation

	6. Production
Recommended reading	Literature recommendations will be made depending on the project.

Subject area	Projects	GD 7
Module	Project V	GD 7.5

Responsible professor	Prof. Dominik Mieth	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	10	
Total time (h)	260	
Teaching time (h)	96	z. B. 16 Days à 6 Hours
Learning time (h)	164	
Semester	7	
Prerequisites		
Teaching form	100 % Project work	
Requirement for the award of ECTS-points		
Type of examination	Project work	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>The fifth project consolidates knowledge in the areas of production, design, art and programming within the framework of a portfolio project with which students can recommend themselves after graduation.</p> <p>The students know and understand industry standards and work processes in the respective field and work out an assignment corresponding to their personal goals.</p> <p>The students can</p> <ul style="list-style-type: none"> ▪ formulate their own learning objectives in the respective subject area. ▪ classify their own specialist knowledge and practical skills in perspective. ▪ consider interdisciplinary knowledge in connection with their own work. ▪ reliably assess and plan tasks and work packages. <p>In order to promote individual development and perspective orientation after graduation, work in project groups is not forced, in contrast to the previous project phases.</p> <p>In addition to purely practically oriented projects, a research project or participation in a current research project of the university is also possible.</p>
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Contents	<ol style="list-style-type: none">1. Project pitch or target definition2. Role definition and, if necessary, team formation3. Milestones4. Process organization5. Production preparation6. Production or implementation
Recommended reading	Literature recommendations will be made depending on the project.

Subject area	Internship Semester	GD 8
Module	Internship Semester and Presentation	GD 8.1

Responsible professor	Prof. Dominik Mieth, Prof. Dr. Michael Bhatti, Prof. Henning Janssen	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	30	
Total time (h)	780	
Teaching time (h)	24	4 Days à 6 Hours
Learning time (h)	756	
Semester	6	
Prerequisites		
Teaching form	Depending on the internship company	
Requirement for the award of ECTS-points		
Type of examination	Presentation; Written Report (25,000 characters +/- 20% incl. spaces) Assessment by the internship provider.	
Grading scheme	Undifferentiated	

Learning outcomes and competencies	<p>Students are able to</p> <ul style="list-style-type: none"> ▪ apply the theoretical and practical concepts taught to solve real work tasks. ▪ integrate themselves socially and communicatively in work teams. ▪ process assigned tasks in a timely manner and in accordance with requirements. ▪ develop their self-perception and the perception of others. ▪ become aware of the values and norms underlying their own actions and assess their significance. ▪ assess the consequences of their actions. <p>Further details on the internship semester are regulated in the guidelines for the internship semester of the Game Design program.</p> <p>The students know and understand how to negotiate the working conditions for a study-relevant internship independently in an internship contract with the respective internship provider.</p>
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	<p>They can</p> <ul style="list-style-type: none"> ▪ practically apply and test the skills learned in the course of their studies in a professional environment. ▪ gain additional in-depth practical knowledge in the respective field of application. ▪ get to know potential employers and the characteristics of the industry. ▪ present and reflect on the technical and methodological knowledge acquired during the internship in an in-depth internship report.
<p>Contents</p>	<p>The content of the internship semester is largely determined by the orientation of the company at which the students complete the internship. The type, scope and quality of the projects and work that students complete during their internships are determined on the one hand by the contact persons in the media companies and on the other hand by the supervising lecturers at MD.H, so that the practical and educational goals of an internship are optimally achieved. In regular meetings with the supervising lecturers, the fulfillment of evaluation criteria is checked and, if necessary, corrected accordingly.</p>
<p>Note</p>	<p>Requirements for the internship company:</p> <ul style="list-style-type: none"> ▪ The internship company is at least indirectly related to computer game development or related areas, especially interactive and new media. ▪ The internship can include diverse, but always industry-relevant professional activities, especially those with a creative, artistic, technical-informatics or business management profile. ▪ The intern should be given the opportunity to gain relevant insights into professional life in general and subject-related professional practice in particular. ▪ If possible, the intern should be assigned tasks that he/she has to implement on his/her own responsibility after an appropriate introduction. ▪ In addition to taking on responsibility, the intern should also have the opportunity (ideally) to get to know several areas of work.

Subject area	Bachelor-Degree	GD 9
Module	Final Thesis and Colloquium	GD 9.1

Responsible professor	Prof. Dominik Mieth, Prof. Dr. Michael Bhatt, Prof. Henning Janssen	
Frequency	Once in the academic year	
Usability	Only in this study program	
ECTS-Points	10	
Total time (h)	260	
Teaching time (h)	0	
Learning time (h)	360	
Semester	7	
Prerequisites		
Requirement for the award of ECTS-points		
Type of examination	Written (Conception) Media Product (Realization)	
Grading scheme	Differentiated (at least the grade 4,0)	

Learning outcomes and competencies	<p>Theoretical thesis</p> <p>The theoretical thesis consists of a scientific examination of a topic or question relevant to the development of digital games. It must show that the students are capable of independent scientific work. The elaboration corresponds to agreed formal requirements.</p> <p>Students will be able to</p> <ul style="list-style-type: none"> ▪ formulate a research question. ▪ select suitable scientific methods for dealing with the topic and justify the selection. ▪ research and evaluate suitable sources on the topic. <p>Both application-oriented and pure research projects are permissible for the thesis. In the case of a pure research project, the practical work can be omitted.</p>
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	<p>Practical thesis</p> <p>The practical thesis serves to prove that the students are able to practically realize an implementation from the games sector that is relevant in the thematic area of the theoretical thesis.</p> <p>The practical work is usually implemented as a media product. It is possible for several students to work together on one implementation. In the area of conception, the practical work can also consist of a corresponding documentation (e.g. design document).</p> <p>The results of the practical work are documented in the written part.</p> <p>Colloquium</p> <p>The colloquium focuses on the subject areas of the final thesis, including neighboring and complementary areas of knowledge. The colloquium is intended to determine whether the students have a sound knowledge in the areas of game design and in the subject areas to which the thesis is thematically assigned.</p> <p>The students are able to</p> <ul style="list-style-type: none"> ▪ conduct a project presentation according to optimized communication and visualization criteria, for the presentation of the final thesis, ▪ contribute well-founded basic knowledge according to the subject areas of the final thesis.
<p>Contents</p>	<ol style="list-style-type: none"> 1. Briefing 2. Exposé 3. Implementation 4. Colloquium
<p>Recommended reading</p>	<p>A recommendation of literature depends on the respective task of the final thesis.</p>