MODULE HANDBOOK

Game Design

M.A.

Master's in Game Design

Technische Hochschule Nürnberg Georg Simon Ohm

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Semester 1

Compulsory modules

Game Design Loop

Code: LOOP · **Subject ID:** LOOP:SU:MGD:, LOOP:Ue:MGD:

Coordinator	Matthias Hopf
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module introduces the complete playcentric design cycle: articulating an intended player experience, designing a playable system, testing it with people, and revising it in response to observations. Students develop paper prototypes of their own game ideas in small groups. The focus is on short iteration cycles and the recognition that a game idea's viability can only be assessed through playtesting. Tracy Fullerton's playcentric approach provides the theoretical foundation.

- Mechanical and emotional building blocks of games: goals, rules, decisions, resources, conflict, uncertainty, and feedback.
- Interplay of formal, dramatic, and dynamic elements in creating tension, curiosity, agency, and a sense of achievement.
- Player types and motivations: introduction to player typologies; applying player motivation profiles to inform design and target audience definition; the relationship between player types and game genre preferences.
- Game genres and conventions: overview of major game genres and their defining formal and emotional characteristics; how genre conventions shape player expectations and design constraints; innovation within and across genres.
- Translation of a creative premise into testable experience goals and simple paper prototypes that can be changed rapidly.
- Planning, conducting, and interpreting playtests within the student group; distinguishing observation, interpretation, and proposed solutions.
- Reasoned revision, simplification, or rejection of designs, and documentation of significant design decisions and insights.

LEARNING OUTCOMES / COMPETENCIES

On successful completion, students can:

- translate an independent creative intention into experience goals, rules, and a paper prototype that can be played with minimal production effort;
- analyze the interaction of mechanical and emotional game elements and formulate assumptions about the resulting player experience;
- classify players using established motivation typologies and derive implications for design decisions and target audience definition;

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- analyze major game genres and their conventions, assess how they shape player expectations, and identify opportunities for innovation within and across genres;
- plan, conduct, and critically interpret focused playtests without treating personal preferences or isolated comments as reliable evidence;
- revise designs in short cycles and use test findings to justify which ideas they retain, change, or discard;
- reflect on their design process and communicate design decisions clearly to an interdisciplinary team.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The module establishes the methodological foundation for project-based game design education. It connects creative authorship with empirical examination of player experience and develops an understanding of games as systems that generate experiences. Rapid prototyping, reflective responses to failure, and reasoned decisions prepare students to develop a shared game vision and prototypes suitable for funding. Knowledge of player types, motivations, and genre conventions anchors design decisions in the intended audience and enables students to position their own designs within the genre landscape and to justify innovation within or deliberately against established expectations. Technical implementation and visual refinement remain means of investigating the design question.

KEY COMPETENCIES

- Creative problem-solving and evidence-informed decision-making.
- Collaboration and clear communication across disciplinary boundaries.
- Observation, perspective-taking, and constructive feedback.
- Openness to criticism, acceptance of failure, and reflection on assumptions.
- Responsible self-organization and prioritization within time constraints.
- Audience awareness and classification of player motivations and genre expectations.

PREREQUISITES

No specific subject knowledge is required; the module accommodates different disciplinary entry backgrounds.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Fullerton, Tracy (2024): Game Design Workshop: A Playcentric Approach to Creating Innovative Games. 5th edition. A K Peters/CRC Press. Core text. https://www.routledge.com/p/book/9781032607009
- Isbister, Katherine (2016): How Games Move Us: Emotion by Design. MIT Press. https://direct.mit.edu/books/book/3115/How-Games-Move-UsEmotion-by-Design
- Costikyan, Greg (2013): Uncertainty in Games. MIT Press. https://mitpress.mit.edu/9780262018968/uncertainty-in-games/
- Schell, Jesse (2019): The Art of Game Design: A Book of Lenses. 3rd edition. CRC Press. https://www.routledge.com/p/book/9781138632059
- Salen, Katie, and Zimmerman, Eric (2003): Rules of Play: Game Design Fundamentals. MIT Press. https://mitpress.mit.edu/9780262240451/rules-of-play/
- Koster, Raph (2013): A Theory of Fun for Game Design. 2nd edition. O'Reilly Media. https://www.oreilly.com/library/view/a-theory-of-fun-for-game-design/9781449367646/
- Yee, Nick, and Ducheneaut, Nicolas (2015): Quantic Foundry Gamer Motivation Model. Quantic Foundry. https://quanticfoundry.com/gamer-motivation-model/

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Team & Project

Team & Projekt

Code: TEAM · **Subject ID:** TEAM:S:MGD:

Coordinator	Lucia Scharbatke
ECTS	2.5
SWS	2
Type of Course	Seminar (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	30 h contact, 45 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module accompanies the formation of viable interdisciplinary teams and the preparation of the two-semester team project in semesters 2 and 3. It covers roles and collaboration in game development teams, the translation of a creative vision into an achievable project scope, and communication, feedback, and decision-making processes.

- Team roles and collaboration: roles across game design, art, programming, narrative, audio, and production; skills mapping, role allocation, ownership, and decision-making.
- Project setup and scoping: from creative vision to achievable project scope, milestones, deliverables, and responsibilities; basic iterative workflows and production planning.
- Communication and feedback: meeting structures, documentation, constructive feedback, and peer review; handling different perspectives and resolving common team conflicts.
- Risk and adaptation: identifying dependencies, bottlenecks, and production risks; prioritisation and scope adjustment in response to changing project conditions.
- Practical exercises: skills map and team agreement; project scope, milestone board, responsibility matrix, and risk check; short team review and individual reflection.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- analyse roles and responsibilities within an interdisciplinary game development team;
- define an achievable project scope and translate it into roles, milestones, deliverables, and responsibilities;
- apply basic iterative planning methods to structure a game development project;
- establish appropriate communication, feedback, and decision-making processes within a project team;
- identify key production risks and propose appropriate adjustments to scope, priorities, or responsibilities;
- reflect on their own professional role and contribution within an interdisciplinary project.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module supports the interdisciplinary teamwork that the programme's concept of "Three Faculties. One Studio." demands. It accompanies the coached formation of project teams and the development of the project idea for the semester 2 and 3 project, laying the social foundation for the entire project-based programme. Acceptance of failure, constructive conflict management, and the ability to develop a shared creative vision within a team are built deliberately and prepare students for leading roles in game development.

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KEY COMPETENCIES

- Teamwork and taking responsibility in mixed teams.
- Constructive communication and feedback across disciplinary boundaries.
- Conflict resolution and working with different professional and thinking styles.
- Structured planning, prioritisation, and risk awareness.
- Reflection and acceptance of failure.

PREREQUISITES

No specific prior knowledge required.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Keith, Clinton (2020): Agile Game Development: Build, Play, Repeat. 2nd edition. Addison-Wesley Professional.
- Hackman, J. Richard (2002): Leading Teams: Setting the Stage for Great Performances. Harvard Business Review Press.
- Schell, Jesse (2019): The Art of Game Design: A Book of Lenses. 3rd edition. CRC Press.
- Selected current case studies and production documents from game and creative-media projects.

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Game Engine 101

Code: ENG · **Subject ID:** ENG:SU:MGD:, ENG:Ue:MGD:

Coordinator	Ingo Scholz
ECTS	2.5
SWS	2
Type of Course	Seminar-style instruction (1 SWS), Practical exercises (1 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	22.5 h contact, 52.5 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module teaches the principles and techniques behind game engines and explores them through group work. Its goal is, that students become engine-capable: they can take an idea handed to them and get a prototype running, playable and testable.

- 2D game engine: scenes, nodes, matrices, and transformations.
- Game loop and gameplay principles.
- User interaction: input handling.
- Textures, sprites, sounds, movies; asset integration.
- Scripting, debugging, and profiling.
- Physics simulation; events, collisions, responses.
- Graphics hardware pipeline; hierarchical scene management.
- Networking and parallelism.
- 3D game engine: 3D real-time graphics effects.
- Deployment.

LEARNING OUTCOMES / COMPETENCIES

Students are able to ...

- give an overview of game engine technology and use the relevant terminology;
- implement a 2D game prototype using a game engine;
- integrate textures, sprites, sounds, and other assets into their prototype;
- apply basic programming concepts to create, manage, and animate their scenes;
- implement a game loop using scripting;
- apply techniques for debugging and optimising within the game engine;
- establish a well-trained basis for further game development in a multidisciplinary team.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module gives all students - regardless of their disciplinary entry background - fluency in the tool: they can make an idea playable themselves. The engine concepts taught (scene graph, components, state machines, signals, input, physics) are the programme's shared vocabulary; they are transferable and form the language in which design, art, and development coordinate. Tool fluency protects the iteration rate on which the playtesting loop depends - changing a rule and testing it must be possible in minutes, not appointments. Technical depth remains bounded - runtime optimisation and network protocols presuppose that the design question has already been answered; the Game Development deep dives go deeper in this direction.

KEY COMPETENCIES

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- Tool fluency and self-directed acquisition of new technologies.
- Structured debugging and systematic problem solving.
- Translating design ideas into working prototypes.
- Collaboration in multidisciplinary teams built on a shared technical vocabulary.

PREREQUISITES
No specific prior knowledge required; the module addresses students from all entry disciplines.

ASSESSMENT
Practical coursework

ASSESSMENT DETAILS
Details will be announced during the first two weeks of the course

LITERATURE

- Godot Engine Documentation. Godot Engine contributors. https://docs.godotengine.org/
- Blender Manual. Blender Foundation. https://docs.blender.org/manual/
- Nystrom, Robert (2014): Game Programming Patterns. Genever Benning. https://gameprogramming patterns.com/
- Sanderson, Grant (3Blue1Brown): Essence of Linear Algebra. Video series. https://www.3blue1brown.com/topics/linear-algebra
- Dunn, Fletcher; Parberry, Ian (2011): 3D Math Primer for Graphics and Game Development. CRC Press. https://gamemath.com

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Game as a System

Game als System

Code: SYS · **Subject ID:** SYS:SU:MGD:, SYS:Ue:MGD:

Coordinator	Thomas Voit
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Single examination

CONTENT

This required module lays the conceptual core of the first semester: games are understood as systems - rules, states, and feedback, whose whole is more than the sum of its parts. It is based on Jesse Schell's "The Art of Game Design".

- Definition of medium; definition of entertainment medium; definition of game.
- The experience: emotions, curiosity, and fun; conflicts, problems, and goals; motivation; the dispositif.
- Systematics of the components of a game - the elemental tetrad (mechanics, story, aesthetics, technology).
- Aesthetics: acoustics, optics, and haptics; style.
- Mechanics: numbers describing space and time.
- Story: characters, setting, and plot; tonality; diegesis; narrative design.
- Technology: engine; dimensionality; interactivity and input; interfaces and peripherals.
- Games as systems: rules, states, and feedback and how they interact.
- Definition of design; games - designed products or works of art?
- Foundations of game design.

LEARNING OUTCOMES / COMPETENCIES

On successful completion, students are able to:

- define a game, distinguish it from other media, and classify its components;
- recognise and describe the making of a game as a design craft for creating media experiences;
- apply the elemental tetrad as an analytical framework and assess the interplay of a game's mechanics, story, aesthetics, and technology;
- analyse games as systems: identify rules, states, and feedback and explain how they interact to create the intended experience;
- recognise design decisions in existing games and assess their effect on emotion, curiosity, and motivation.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module is the core module of the first semester: it brings the heterogeneous entry qualifications of the cohort up to a common conceptual level and establishes Schell's "The Art of Game Design" as the programme's core text. It sharpens the analytical view of games and the understanding of the game as a system (level 5-6 according to Anderson & Krathwohl), on which the Game Analysis Seminar, Game Science, and the Core Game Design deep dives build. At the same time it provides the shared vocabulary with which design, development, and art collaborate across disciplinary boundaries in interdisciplinary teams.

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KEY COMPETENCIES

- Systems thinking and analytical thinking.
- Precise subject vocabulary across disciplinary boundaries.
- Reflective treatment of games as cultural and designed products.
- Justifying and defending design judgements.

PREREQUISITES

No specific subject knowledge is required; the module accommodates different disciplinary entry backgrounds.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Schell, Jesse (2020): The Art of Game Design: A Book of Lenses. 3rd edition. CRC Press.
- McLuhan, Marshall (1964): Understanding Media: The Extensions of Man. McGraw-Hill.
- Greenough, Horatio (1958): Form and Function: Remarks on Art, Design and Architecture. University of California Press.
- Moriarty, Brian (2011): An Apology for Roger Ebert. GDC Vault talk.

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Semester 2

Compulsory modules

Project Part 1

Projekt Teil 1

Code: PROJ1 · **Subject ID:** PROJ1:S:MGD:

Coordinator	Matthias Hopf
ECTS	10
SWS	5
Type of Course	Project (5 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	50 h contact, 250 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module starts the two-semester team project (3-5 students) that aims at a fundable prototype. Mixed teams work from the game concept through playable prototypes to a reasoned continuation decision at the end of the semester. Innovative game ideas and risk-taking are explicitly rewarded; failure is an option and treated as a learning case.

- Concept development and vision: defining the core idea, unique selling proposition (USP), and target audience; writing a game design pitch and vision document.
- Core mechanics prototyping: rapid prototyping methods (paper, digital, physical); identifying and testing the “moment-to-moment” gameplay loop; iterating based on internal and external playtests.
- Early validation and playtesting: designing playtest sessions for early-stage mechanics; collecting and analysing qualitative and quantitative feedback; using feedback to pivot or persevere on design decisions.
- Community building: selecting platforms and tools for community engagement; creating early teasers, devlogs, and social content; establishing feedback loops with early adopters and testers.
- Production planning: scoping for a demonstrator/pitch target; task breakdown, role assignment, and milestone setting; risk assessment and contingency planning.
- Mid-project review: group presentations of prototype and community status; peer and mentor feedback session; planning the transition to Project Part 2.

The semester ends with a playtest and a presentation justifying why the prototype should be continued; continuation must be approved.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- formulate a compelling core game concept and vision statement suitable for a new studio start-up;
- design and prototype core game mechanics using rapid iteration and paper or digital prototyping;
- validate early design hypotheses through structured playtesting and feedback collection;
- establish a foundational community around the game concept by selecting appropriate channels and creating early engagement materials;
- plan and document the initial production roadmap, including scope, milestones, and team responsibilities;

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- present the initial game concept and prototype to peers and mentors, incorporating feedback into the next development phase;
- justify continuation, pivoting, or controlled termination of the project on the basis of test findings.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module is the backbone of the second semester and the first run of the two-semester team project that forms the backbone of the programme. It connects the competences of the first semester - playcentric design, teamwork, engine skills, games as systems - in a real production effort in mixed teams. The open handling of failure, public playtests, and the reasoned continuation decision practise exactly the stance the programme teaches: committing to a creative intent, testing it with people, and acting on the findings. The work towards a fundable prototype and early community building directly prepare the programme's goal - a fundable and viable proof of concept, preferably as a published demo.

KEY COMPETENCIES

- Interdisciplinary teamwork and taking responsibility.
- Iterative, hypothesis-driven work and evidence-informed decision-making.
- Project organisation: scoping, milestones, risk management.
- Presentation and pitching skills; constructive handling of critique.
- Acceptance of failure and capacity for reflection.

PREREQUISITES

Completion of the modules Game Design Loop, Team & Project, and Game Engine 101.

ASSESSMENT

Term paper

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Project Guidelines
- Fullerton, Tracy (2024): Game Design Workshop: A Playcentric Approach to Creating Innovative Games. 5th edition. A K Peters/CRC Press.
- Keith, Clinton (2020): Agile Game Development: Build, Play, Repeat. 2nd edition. Addison-Wesley Professional.

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Subject-Specific Mentoring Part 1

Themenspezifisches Mentoring Teil 1

Code: MENT1 · **Subject ID:** MENT1:S:MGD:

Coordinator	Manuel Casasola Merkle
ECTS	2.5
SWS	2
Type of Course	Seminar (2 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	30 h contact, 45 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module organises teaching the way a studio works: demand-driven, project-adjacent mentoring instead of fixed frontal teaching. Faculty from the three faculties register topics they offer; the project teams draw on them as needed. Every student attends at least two mentoring sessions per semester.

- Needs assessment: identifying project-specific knowledge requirements; selecting an appropriate mentor and defining the scope.
- Mentoring sessions: ad-hoc, individual consultations with professors or experts. Topics vary per project and may include psychology, multiplayer and networking, graphics, audio, AI, narrative design, art style, economy balancing, monetisation, localisation, or accessibility.
- Application and documentation: translating mentoring insights into concrete project changes; a brief written reflection on outcomes and integration into the ongoing project workflow.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- identify and articulate domain-specific knowledge gaps relevant to their game project;
- engage in focused, self-directed learning with a subject-matter expert;
- apply specialised insights (e.g. psychology, networking, graphics) to improve design or technical decisions;
- integrate mentoring outcomes into the ongoing project workflow and document their effect.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module implements the principle of “demand-driven mentoring instead of fixed frontal teaching” that underpins the programme’s working mode. Teams acquire expertise where their project needs it and simultaneously learn to seek, absorb, and apply knowledge - a core competence for leading roles in game development. The consultations foster exchange across disciplinary and faculty boundaries and anchor the team projects in the expertise of all three faculties.

KEY COMPETENCIES

- Self-directed learning and needs recognition.
- Professional communication with experts.
- Transferring specialist knowledge into the own project context.
- Documentation skills and reflection on the own learning process.
- Initiative and responsibility for the own learning progress.

PREREQUISITES

Completion of the modules Game Design Loop, Team & Project, and Game Engine 101.

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ASSESSMENT
Practical coursework

ASSESSMENT DETAILS
Details will be announced during the first two weeks of the course

LITERATURE

- Kram, Kathy E. (1988): Mentoring at Work: Developmental Relationships in Organizational Life. University Press of America.
- Allen, Tammy D.; Eby, Lillian T. (eds.) (2007): The Blackwell Handbook of Mentoring: A Multiple Perspectives Approach. Blackwell Publishing.
- Schön, Donald A. (1983): The Reflective Practitioner: How Professionals Think in Action. Basic Books.
- Amabile, Teresa M.; Kramer, Steven J. (2011): The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work. Harvard Business Review Press.

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Community Building & Pitching

Code: COMM · **Subject ID:** COMM:S:MGD:

Coordinator	Lucia Scharbatke
ECTS	5
SWS	4
Type of Course	Seminar (4 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	60 h contact, 90 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module teaches how game projects gain visibility early on: from positioning towards target audiences and stakeholders, through translating the creative vision into pitch formats, to building an early community as a pillar of indie visibility.

- Audience, stakeholders, and positioning: target audiences, player communities, stakeholder mapping, USP, positioning, and value proposition; understanding what different professional audiences need to know about a project.
- From game concept to pitch story: core experience, logline, elevator pitch, project description, key messages, and the narrative of the pitch; translating mechanics, aesthetics, narrative, and player experience into a coherent proposition.
- Professional pitching and packaging: pitch structures for publishers, funding bodies, investors, festivals, and partners; pitch deck, one-pager, visual materials, prototype/trailer integration, presentation technique, and Q&A.
- Audience development and early community: early adopters, suitable communication channels, authentic engagement, and feedback loops; community building as support for development and validation, distinct from release marketing.
- International professional communication: professional English, networking, intercultural presentation contexts, and adapting a pitch to different stakeholders.
- Practical pitch labs: positioning and logline exercises; pitch-deck critique and iterative refinement; short pitches, peer feedback, mock pitch panel, and Q&A training.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- analyse relevant target audiences, stakeholders, and early communities for a game project;
- develop a clear positioning, value proposition, and communication strategy for a game concept;
- translate the core experience and creative vision of a game into coherent written, visual, and verbal pitch formats;
- develop professional pitch materials adapted to specific stakeholders such as publishers, funding bodies, investors, festivals, or project partners;
- present and defend a game project convincingly in a professional pitch and Q&A setting;
- develop an appropriate early-stage audience and community approach that supports project development;
- evaluate feedback from peers, audiences, and professional stakeholders and use it to refine positioning and pitch materials.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module establishes community building as a pillar of indie visibility, started early in the project rather than after graduation.

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It strengthens the ability to communicate and advocate a creative vision convincingly - a core capability of the leading role the programme prepares students for. Students also become familiar with all projects of the programme, fostering networking and long-term collaborations within the cohort. Pitching towards publishers, funding bodies, and investors directly prepares students for making their project prototypes fundable and for potential studio foundations.

KEY COMPETENCIES

- Presentation technique and convincing argumentation in front of an audience.
- Analysis of target audiences and stakeholder perspectives.
- Professional communication in English, including intercultural contexts.
- Constructive handling of feedback and iterative refinement.
- Networking and relationship building in the games industry.

PREREQUISITES

No specific prior knowledge required.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Duarte, Nancy (2010): Resonate: Present Visual Stories that Transform Audiences. Wiley.
- Gallo, Carmine (2014): Talk Like TED: The 9 Public-Speaking Secrets of the World's Top Minds. St. Martin's Press.
- Cialdini, Robert B. (2021): Influence, New and Expanded: The Psychology of Persuasion. Harper Business.
- Selected current pitch decks, funding guidelines, publisher materials, festival requirements, and industry case studies.

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Game Analysis Seminar

Seminar zur Game-Analyse

Code: ANL · **Subject ID:** ANL:S:MGD:

Coordinator	Matthias Hopf
ECTS	2.5
SWS	2
Type of Course	Seminar (2 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	30 h contact, 45 h self-study
Language	English
Examination Type	Single examination

CONTENT

The seminar analyses other people's games, both good and bad, and places their design decisions in a theoretical context. Students learn to recognise the vision behind a game's experience and to evaluate the orchestrated design of all game components.

- Foundations of game design: the gameplay loop; progress.
- Genres and structures.
- Story as always existing flavour: fiction and documentation; extrinsic and intrinsic motivation.
- Design coherence - from vision to experience in all elements.
- Practical analysis: level design, gameplay, and storytelling.

LEARNING OUTCOMES / COMPETENCIES

On successful completion, students are able to:

- understand the player experience as the core of a consumer experience;
- recognise and analyse the vision for a game's experience;
- evaluate the orchestrated, purposeful design of a game's components;
- classify, justify, and defend their own and others' design decisions.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module trains the analytical view of games (level 5-6 according to Anderson & Krathwohl): students analyse other people's games

- successful and failed ones - and learn to classify, justify, and defend

design decisions. This judgement flows directly into their own team projects, for example in playtests, design reviews, and pitches, and prepares them for Game Science and the master's thesis. At the end of the semester, moreover, all students know the same games and thus share a common reference and discourse base for their further work in the programme.

KEY COMPETENCIES

- Analytical thinking and precise description of player experience.
- Arguing for and defending judgements in front of the group.
- Constructive engagement with critique of one's own and others' games.
- Switching between player and designer perspectives.

PREREQUISITES

A first attempt at the examination of the module Game as a System is required.

ASSESSMENT

Term paper

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ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Schell, Jesse (2020): The Art of Game Design: A Book of Lenses. 3rd edition. CRC Press.
- Vogler, Christopher (2001): The Writer's Journey: Mythic Structure for Writers. 2nd edition. Michael Wiese Productions.
- Koster, Raph (2005): A Theory of Fun for Game Design. Paraglyph Press.
- Juul, Jesper (2005): Half-Real: Video Games between Real Rules and Fictional Worlds. MIT Press.

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Semester 3

Compulsory modules

Project Part 2

Projekt Teil 2

Code: PROJ2 · **Subject ID:** PROJ2:S:MGD:

Coordinator	Matthias Hopf
ECTS	10
SWS	5
Type of Course	Project (5 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	50 h contact, 250 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module continues the two-semester team project - in the same team or, as a new project, in a newly assembled team. It carries the project from the tested prototype to a professional pitch package with demonstrator suitable for investors or governmental funding bodies. The focus lies on refinement, polish, and the convincing presentation of the project.

- Mechanical refinement and balancing: tuning variables for fairness, challenge, and engagement; balancing player abilities, progression, and resource economies; addressing feedback from the Project Part 1 playtests.
- Polish and game feel: enhancing visual feedback, animations, and UI/UX; implementing audio and haptic feedback; applying “juice” principles to improve perceived quality.
- Comprehensive playtesting: structured alpha/beta testing protocols; bug triage, usability testing, and edge-case analysis; final iteration cycles based on test results.
- Pitch package development: building the demonstrator (vertical slice or focused demo); creating pitch decks, one-pagers, and supporting documentation; budgeting, timeline, and team structure for potential funders.
- Pitching and presentation: pitching to investors versus governmental/cultural funding bodies; mock pitch sessions with Q&A and feedback; refining the narrative and the financial/cultural argument.
- Final delivery and retrospective: final demonstrator submission; group presentation and pitch to a panel; team retrospective with lessons learned and future steps.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- refine and balance core and secondary game mechanics to achieve a stable, engaging player experience;
- apply polishing techniques to improve game feel (juice), visual clarity, and audio feedback;
- conduct comprehensive playtesting to identify and resolve edge cases, difficulty spikes, and usability issues;
- develop a professional pitch package (demo, presentation, documentation) suitable for investors or governmental funding bodies;
- articulate the game’s market potential, audience fit, and financial or cultural value in a formal pitch setting;

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- evaluate and incorporate final feedback to deliver a demonstrator that represents the team's design vision and production capabilities.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module completes the two-semester team project that forms the backbone of the programme. It leads from the tested prototype to a fundable result - at most a vertical slice, not a finished game - and thus trains exactly the production goals of the programme: a fundable and viable proof of concept, preferably as a published demo. Refinement, balancing, and polish demonstrate that quality is measured against players; the pitch package translates the design work into a funding and publication case. It thereby prepares students directly for studio foundations, for the master's thesis, and for game design roles in larger teams.

KEY COMPETENCIES

- Interdisciplinary teamwork and responsibility in the final phase of a project.
- Prioritisation and quality decisions under limited resources.
- Systematic testing and evidence-informed decision-making.
- Pitching and presentation skills in funding and investor contexts.
- Reflection and team retrospection.

PREREQUISITES

Completion of the modules Project Part 1 and Game Engine 101.

ASSESSMENT

Term paper

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Project Guidelines
- Fullerton, Tracy (2024): Game Design Workshop: A Playcentric Approach to Creating Innovative Games. 5th edition. A K Peters/CRC Press.
- Keith, Clinton (2020): Agile Game Development: Build, Play, Repeat. 2nd edition. Addison-Wesley Professional.

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Subject-Specific Mentoring Part 2

Themenspezifisches Mentoring Teil 2

Code: MENT2 · **Subject ID:** MENT2:S:MGD:

Coordinator	Manuel Casasola Merkle
ECTS	2.5
SWS	2
Type of Course	Seminar (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	30 h contact, 45 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module continues the demand-driven, project-adjacent mentoring of part 1: faculty from the three faculties register topics they offer; the project teams draw on them as needed. Every student attends at least two mentoring sessions per semester. In the third semester, the focus lies on the decisions that carry the project work towards a fundable prototype and a viable continuation.

- Needs assessment: identifying project-specific knowledge requirements; selecting an appropriate mentor and defining the scope.
- Mentoring sessions: ad-hoc, individual consultations with professors or experts. Topics vary per project and may include psychology, multiplayer and networking, graphics, audio, AI, narrative design, art style, economy balancing, monetisation, localisation, or accessibility.
- Application and documentation: translating mentoring insights into concrete project changes; a brief written reflection on outcomes and integration into the ongoing project workflow.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- identify and articulate domain-specific knowledge gaps relevant to their game project;
- engage in focused, self-directed learning with a subject-matter expert;
- apply specialised insights (e.g. psychology, networking, graphics) to improve design or technical decisions;
- integrate mentoring outcomes into the ongoing project workflow and document their effect.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module continues the principle of “demand-driven mentoring instead of fixed frontal teaching” in the decisive phase of the project work, in which tested prototypes must turn into fundable concepts. Teams acquire expertise where their project needs it and practise seeking, absorbing, and applying knowledge - a core competence for leading roles in game development. The consultations foster exchange across disciplinary and faculty boundaries and anchor the team projects in the expertise of all three faculties.

KEY COMPETENCIES

- Self-directed learning and needs recognition.
- Professional communication with experts.
- Transferring specialist knowledge into the own project context.
- Documentation skills and reflection on the own learning process.
- Initiative and responsibility for the own learning progress.

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PREREQUISITES
Completion of the module Project Part 1.

ASSESSMENT
Practical coursework

ASSESSMENT DETAILS
Details will be announced during the first two weeks of the course

LITERATURE

- Kram, Kathy E. (1988): Mentoring at Work: Developmental Relationships in Organizational Life. University Press of America.
- Allen, Tammy D.; Eby, Lillian T. (eds.) (2007): The Blackwell Handbook of Mentoring: A Multiple Perspectives Approach. Blackwell Publishing.
- Schön, Donald A. (1983): The Reflective Practitioner: How Professionals Think in Action. Basic Books.
- Amabile, Teresa M.; Kramer, Steven J. (2011): The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work. Harvard Business Review Press.

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Game Science

Code: SCI · **Subject ID:** SCI:SU:MGD:, SCI:Ue:MGD:

Coordinator	Thomas Voit
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module is about applied game research and its central open question: where does the fun in a game come from, and how does it get there? Game development is an old cultural practice that still relies mostly on intuition and trial and error. Game science asks how scientific methods can turn this experience into knowledge that designers can use, so that the art of game design gets a better foundation rather than being replaced.

- A systemic view of games: games as systems composed of subsystems. The thematic subsystem creates interest in the game, the mechanical subsystem keeps up motivation during play, the material/technological subsystem provides affordance to play, and the aesthetic subsystem provides sensation in play. The module also looks at how these subsystems interact and where they clash.
- Research objectives: the knowledge interest aims to understand games, the design interest aims to shape them; each interest applies to a methodological mandate (methods of game development) and a content-functional mandate (how games affect players). This yields four research objectives.
- Research methods: structured game analysis, design patterns and pattern mining, removing elements in thought experiments, theories of motivation and emotion, corpus-based and data-driven methods, and player-centred empirical studies.

LEARNING OUTCOMES / COMPETENCIES

After completing the module, students are able to:

- explain and compare established methods for analysing and designing the subsystems of games, and assess how well grounded these methods are;
- analyse how existing games create interest, motivation, and affordance;
- develop new methods or tools for game design based on research findings, or adapt existing ones, and evaluate how well they work;
- formulate their own research questions in game science and plan an interdisciplinary research design for them.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module is the follow-up module to Game as a System: it professionalises scientific work on and with games and prepares students for the master's thesis. It deepens the understanding of the game as a system of subsystems and sharpens the analytical view (level 5-6 according to Anderson & Krathwohl). Students learn to examine design decisions with research methods, to formulate their own research questions, and to plan interdisciplinary research designs - the bridge between design practice and science that the programme aims for. The resulting judgement about

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methods and evidence flows directly into the team projects, for example in playtests, balancing, and evaluation.

KEY COMPETENCIES

- Applying: students apply methods of game research (game analysis, pattern analysis, element-removal experiments, corpus-based analysis) to specific games.
- Analysing: students break games down into their thematic, mechanical, and material elements, examine how these elements relate to each other, and place research designs within the four research objectives.
- Evaluating: students critically assess which research method suits which question, what its strengths and limits are, and how strong its empirical evidence is.
- Creating: students develop their own research questions and research designs, adapt existing methods or create new ones, and use research findings to design and validate games or game elements.

PREREQUISITES

A first attempt at the examination of the module Game as a System is required.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Barney, Christopher (2021): Pattern Language for Game Design. CRC Press.
- Creswell, John W. (2003): Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE Publications.
- Fullerton, Tracy (2014): Game Design Workshop: A Playcentric Approach to Creating Innovative Games. 3rd edition. A K Peters/CRC Press.
- Salen, Katie; Zimmerman, Eric (2004): Rules of Play: Game Design Fundamentals. The MIT Press.
- Voit, Thomas; Mazarakis, Athanasios; Bräuer, Philipp (2026): AI-driven game design: The EMPAMOS gamification framework. PeerJ Computer Science, 12, e3633. https://doi.org/10.7717/peerj-cs.3633

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Business Basics

Grundlagen Business

Code: BUS · **Subject ID:** BUS:SU:MGD:, BUS:Ue:MGD:

Coordinator	Lucia Scharbatke
ECTS	2.5
SWS	2
Type of Course	Seminar-style instruction (1 SWS), Practical exercises (1 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	30 h contact, 45 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module provides the economic foundations for developing and marketing games. It covers the economic relationships between developers, publishers, platforms, funding bodies, and other partners in the games industry, as well as selected business, financing, and exploitation models.

- Roles and business relationships: independent development, publisher-supported development, and work-for-hire as selected examples.
- Revenue models and revenue sharing; economic implications of distribution and monetisation choices at an introductory level.
- Budgeting and production economics: development costs, simplified production budgets, scope-versus-budget decisions, and contingency thinking; basic cash-flow logic and simple break-even scenarios.
- Financing and funding: publisher financing, public funding, private investment, crowdfunding, and self-financing; basic structure of a financing plan and implications for project decisions.
- Rights and contractual basics: copyright, intellectual property, ownership, licensing, third-party assets, and basic collaboration considerations; focus on recognising relevant issues and knowing when specialist legal advice is required.
- Practical exercises: simplified game budget and scope exercise, financing and break-even scenario, short rights/IP case study, and development of a concise business case for a game project.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- explain basic economic relationships between developers, publishers, platforms, funding bodies, and other key partners in the games industry;
- distinguish selected business, financing, and exploitation models relevant to game development;
- prepare a simplified production budget and assess the relationship between project scope, costs, and available resources;
- develop basic financing and revenue scenarios and calculate a simple break-even point;
- identify fundamental intellectual property, ownership, licensing, and contractual issues relevant to a game project;
- integrate these elements into a concise and plausible business case for a game project.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module provides the entrepreneurship and business knowledge that the programme explicitly aims to develop. It enables students to position their semester 2 and 3 projects economically, make them viable for funding, and argue their case towards publishers, funding bodies, and investors. It thus supports the programme's indie orientation and possible studio foundations after graduation; legal and economic questions are

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deliberately treated at an overview level, including knowing when to involve specialists.

KEY COMPETENCIES

- Basic economic literacy and structured planning competence.
- Estimating effort, costs, and resources under uncertainty.
- Legal awareness and knowledge of the limits of one's own competence.
- Argumentation and communication skills towards business partners.
- Independent, results-oriented work on practical case studies.

PREREQUISITES

No specific prior knowledge required.

ASSESSMENT

Written exam (90 min)

LITERATURE

- Chandler, Heather Maxwell (2020): The Game Production Toolbox. CRC Press.
- Osterwalder, Alexander; Pigneur, Yves (2010): Business Model Generation. Wiley.
- Selected current industry reports, public funding guidelines, platform documentation, sample deal structures, and case studies.

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Semester 4

Compulsory modules

Master's Thesis

Masterarbeit

Code: MA · **Subject ID:** MA:S:MGD:

Coordinator	Matthias Hopf
ECTS	20
SWS	0
Type of Course	Master's thesis (independent scientific work) (0 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	0 h contact, 600 h self-study
Language	English
Examination Type	Single examination

CONTENT

The master's thesis is an independent piece of scientific work that, as a rule, builds on one or both project modules. In it, students demonstrate that they can apply the knowledge and skills acquired during the programme to complex tasks. The main focus lies both on the creative development of new processes and methods and on a comprehensive systematic approach.

- Conceptual project design: research or design question, intended experience, and methodological approach.
- Decision-making regarding the most appropriate solution, weighing design, technical, and production criteria.
- Development of prototypes and programmes to investigate the design question.
- Measurements, playtests, and their evaluation as the empirical basis of the thesis.
- Writing up the thesis report.
- Reading and independent study.

The thesis should be written in English; the topic must be such that the thesis can normally be completed within six months of continuous work.

LEARNING OUTCOMES / COMPETENCIES

On successful completion of the module, students are able to:

- approach and solve independently an extensive problem in the field of game design by applying their own academic knowledge;
- plan, conduct, and document a design project methodically;
- compare solution alternatives systematically and justify the choice of the most appropriate one;
- develop prototypes and programmes and use measurements and playtests to assess the intended experience;
- present and situate the results in a scientific thesis addressed to its audience;
- present the results of the thesis, their subject-related contexts and references orally, and justify them independently (colloquium).

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The master's thesis concludes the programme and, as a rule, builds on one or both project modules. It consolidates the competence the programme

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aims at - leading the design of an experience system from creative intent through tested prototypes to a scientifically grounded result - in an independent piece of scientific work, and prepares students for professional practice or doctoral studies. Together with the colloquium, it demonstrates that graduates can develop, examine, and advocate an artistic vision of their own.

KEY COMPETENCIES

- Independence and responsibility in a long-term project.
- Scientific and methodological working practices.
- Reflection and decision-making under uncertainty.
- Written and oral communication of complex subject matter.
- Integration across disciplinary and role boundaries.

PREREQUISITES

Completion of the module Game Science.

ENTRY REQUIREMENTS

Evidence of at least 60 ECTS credit points.

EXAMINATION PREREQUISITES

First attempt at the examination of the module Project Part 2.

ASSESSMENT

Master's thesis

ASSESSMENT DETAILS

Written master's thesis with colloquium; the final presentation lasts 30 minutes plus discussion and questioning, and its result is included in the grading of the thesis.

LITERATURE

- Academic Writing Guidelines

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Master Seminar

Masterseminar

Code: MSEM · **Subject ID:** MSEM:S:MGD:

Coordinator	Matthias Hopf
ECTS	2.5
SWS	2
Type of Course	Colloquium (2 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	22 h contact, 53 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module is the accompanying colloquium of the master's phase. It supports the writing of the master's thesis from topic selection to the public final presentation, ensuring that the work is methodologically sound, realistically scheduled, and situated in its academic and game context.

Guidance on methodical scientific work through:

- Exchange of experience between the thesis projects of the cohort.
- Extensive literature search and analysis of related games and experiences.
- Deepening and securing subject-specific and methodological knowledge.
- Short presentations of interim results during the thesis writing.
- Final presentation with discussion and questioning.

LEARNING OUTCOMES / COMPETENCIES

On successful completion of the module, students are able to:

- approach and solve independently an extensive problem in the field of game design by applying their own academic knowledge;
- structure and schedule their thesis project methodically;
- present the current state of their work clearly in short presentations and open it up for discussion;
- apply the knowledge and skills acquired during the programme to complex tasks in an independent, scientific piece of work;
- incorporate feedback from supervisors and peers into their work;
- present the results of the master's thesis, their subject-related contexts and references orally, and justify them independently.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module structures the master's phase and safeguards the academic quality of the theses. It turns the individual thesis into a publicly negotiated process: interim results are presented, criticised, and improved, and the final presentation is public. The module thus connects scientific work with the communication and defence skills required for leading roles in game development and for subsequent doctoral studies. It also prepares the public final presentation through which the programme's goal - a fundable and viable proof of concept - becomes visible.

KEY COMPETENCIES

- Scientific and methodological working practices.
- Time and self-management in a long-term project.

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- Presentation and discourse skills in front of an academic audience.
- Constructive handling of critique and feedback.
- Perspective-taking across the disciplines of the cohort.

PREREQUISITES
No specific prior knowledge required; the module accompanies the master's thesis.

ASSESSMENT
Presentation

ASSESSMENT DETAILS
Final presentation of 30 minutes plus discussion and questioning; the result is included in the grading of the master's thesis.

LITERATURE
- Academic Writing Guidelines

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Publication and Marketing

Publikation und Marketing

Code: PUBL · **Subject ID:** PUBL:S:MGD:

Coordinator	Lucia Scharbatke
ECTS	2.5
SWS	2
Type of Course	Seminar (2 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	30 h contact, 45 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module covers the path of a game project from development to public release. Publishing and marketing games work differently than in other media; the module provides the foundations needed for this.

- Publication and launch strategy: from development project to public release; publication goals, release pathways, timelines, self-publishing versus publisher-supported release.
- Platforms, festivals, and showcases: overview of digital distribution, submission requirements, festivals, showcases, competitions, and industry events; selecting opportunities that fit the specific project rather than detailed platform operations.
- Packaging and release communication: key messages, visual consistency, store/festival descriptions, key art, screenshots, trailers, press kits, and promotional assets; translating the positioning developed in Community Building & Pitching into release-ready communication.
- Press, creators, and community at launch: basic press relations, review materials, content creators, social communication, and community activation; overview of organic and paid communication; specialist performance marketing only as contextual knowledge.
- Launch planning and evaluation: pre-launch, launch, and post-launch communication calendar, responsibilities, resources, and basic metrics; responding to feedback and maintaining communication after release.
- Practical publication workshop: writing a store/festival description and press text; selecting or developing a coherent asset package; building a concise publication plan and launch calendar.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- develop a focused publication and launch strategy for a game project based on its positioning, target audience, and available resources;
- select appropriate distribution channels, festivals, showcases, and other publication opportunities for a specific project;
- translate an established project positioning into consistent release communication and selected promotional assets;
- plan appropriate press, creator, community, social-media, and event activities around a release;
- develop a realistic publication and communication timeline covering pre-launch, launch, and initial post-launch activities.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module completes the visibility track of the programme that began in semester 2 with Community Building & Pitching: early community building turns into a concrete publication strategy for the project prototypes. It takes into account that publishing and marketing games work differently than in other media and prepares students for the

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self-reliance typical of indie distribution. It thus directly supports the programme's goal of producing fundable and viable proofs of concept - preferably as a published demo - and strengthens preparation for studio foundations after graduation.

KEY COMPETENCIES

- Strategic planning under resource constraints.
- Evaluating and selecting channels and publication opportunities.
- Audience-oriented, consistent communication.
- Interpreting basic metrics and adapting communication accordingly.

PREREQUISITES

Completion of the module Community Building & Pitching.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Berger, Jonah (2013): Contagious: Why Things Catch On. Simon & Schuster.
- Kotler, Philip; Keller, Kevin Lane; Chernev, Alexander (2022): Marketing Management. 16th edition. Pearson.
- Selected current platform guidelines, press-kit examples, festival submission guidelines, industry reports, and launch case studies.

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Polishing + Beyond

Code: POL · **Subject ID:** POL:S:MGD:

Coordinator	Tilman Zitzmann
ECTS	5
SWS	4
Type of Course	Seminar (4 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	60 h contact, 90 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module polishes the students' project work and builds the portfolio for entering the profession. "Polish" means raising the quality of what exists instead of adding features; the qualities of a polished game are legibility, consistency, responsiveness, and the absence of friction.

- What polish is: raising the quality of what exists instead of adding features. Qualities of a polished game: legibility, consistency, responsiveness, absence of friction.
- Analysis of released games: comparing versions of the same game - prototype against release version, announcement against release trailer, versions of store pages; patch notes and postmortems as secondary sources.
- Observation and priorities: watching other people play instead of asking them; the first five minutes as a separate problem; turning observations into a polish list and a cut list, and deciding what stays unfinished on purpose.
- Audiovisual polish: style audit, legibility during play, cleaning up the interface; feedback and juice: timing, particles, camera movement, transitions; sound: mixing levels, missing responses, repetition; the edges of the game: title screen, options, pause, loading, credits, onboarding.
- Appearance beyond the game: what an image may promise; key art and store capsule, screenshots, short clips; trailers: structure, first seconds, play instead of logos; store page, press material, and physical objects.
- Practice and critique: working on the own prototype and material in short iterations, with presentations of intermediate states and critique in the group.

LEARNING OUTCOMES / COMPETENCIES

On successful completion of the module, students are able to:

- explain what polish means in game development, distinguish it from adding features, and name the qualities a polished game shows;
- analyse released games for the polish they received and for the way they present themselves beyond the game, and put the observed decisions into words;
- observe other people playing their own game and derive concrete measures from what they see and from the critique of others;
- set priorities within a limited budget of time and justify what is polished, what is cut, and what is left as it is;
- improve the legibility, consistency, and feedback of their own prototype, including its edges: title screen, options, pause, and the first minutes;
- translate the experience of their game into key art, screenshots, trailer, and store material without promising more than the game delivers.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required module secures the transition from the project work into

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the master's phase and professional practice. It turns the findings from the team projects into visible quality: polish, legibility, and feedback turn a working prototype into a convincing experience. At the same time, it builds the portfolio - key art, screenshots, trailer, store material - with which graduates make their project visible to funding bodies, publishers, and communities, including support for funding applications. It thus directly supports the programme's goal of a fundable, viable, and preferably published proof of concept.

KEY COMPETENCIES

- Observation-based quality analysis and prioritisation.
- Arguing for cut and polish decisions within a time budget.
- Visual and auditive expressiveness and consistent communication.
- Giving and receiving critique on mature intermediate states.
- Portfolio thinking: presenting oneself beyond the artefact.

PREREQUISITES

Completion of the module Project Part 2.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Swink, Steve (2009): Game Feel. A Game Designer's Guide to Virtual Sensation. Morgan Kaufmann.
- Hodent, Celia (2017): The Gamer's Brain. How Neuroscience and UX Can Impact Video Game Design. CRC Press.
- Jonasson, Martin; Purho, Petri (2012): Juice It or Lose It. Talk, GDC Europe 2012.
- Nijman, Jan Willem (2013): The Art of Screenshake. Talk, INDIGO 2013.

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Subject-specific required elective modules

"Basics" group (Semester 1, 15 ECTS)

Programming and Media Technology 101

Programmierung und Medientechnik 101

Code: bPROG · **Subject ID:** bPROG:SU:MGD:, bPROG:Ue:MGD:

Coordinator	Stephan Rehfeld
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	50 h contact, 100 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module provides the programming and technology fundamentals for students without a technical background. It covers the representation of information in computers, imperative programming, and the typical tools of software development, up to implementing small interactive applications in a game engine.

- Representation of information in computers: integers, floating-point numbers, text, and vectors.
- Fundamentals of image and audio representation.
- Control structures and structuring of software.
- Interpreters and compilers.
- Programming applications in a game engine.
- Concepts and workflows of version control software.
- Debugging software.
- Integrated development environments.
- Using frameworks and libraries.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- understand and apply imperative programming;
- understand the workings of a computer;
- know and use the typical tools of software development;
- implement small interactive applications, for example classic games such as Tetris or Asteroids.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The module brings students without a technical background up to the common level required for the programme, forming the technical pillar of the “Basics” electives. It builds the tool fluency the programme presupposes: those who are not fluent in the tool fight the tool instead of the design, and exactly then the iteration rate collapses. It prepares students for Game Engine 101 and for the technical deep dives and enables them to make their own design ideas playable. It contributes to the “development tools” competence (level 3-4 according to Anderson & Krathwohl).

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KEY COMPETENCIES

- Abstraction and structured problem-solving.
- Systematic debugging and analysis of technical issues.
- Independent familiarisation with tools and technical documentation.
- Acceptance of errors as part of the development process.

PREREQUISITES

No specific prior knowledge required.

ENTRY REQUIREMENTS

Assignment as one of the three elective-compulsory modules of the “Basics” group individually determined by the examination board (no free choice).

ASSESSMENT

Oral exam (30 min)

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Skript der Dozierenden
- Petzold, Charles (2022): Code: The Hidden Language of Computer Hardware and Software. 2nd edition. Microsoft Press.
- Godot Engine: Offizielle Dokumentation. https://docs.godotengine.org/

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Aesthetics 101

Ästhetik 101

Code: bAEST · **Subject ID:** bAEST:SU:MGD:, bAEST:Ue:MGD:

Coordinator	Tilman Zitzmann
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module teaches the audiovisual fundamentals with which a game shapes perception, legibility, and experience. “Aesthetics” is understood as sensory design and aesthetic experience: the interaction loop of information, affordance, reaction, and feedback, and the emotional registers of play such as joy, suspense, mystery, challenge, flow, and empathy.

- Conditions of output and use: screens and devices from phone over computer screen to television (physical size, resolution, viewing distance, aspect ratio) and what they mean for the size of elements and the amount of detail that survives; sound and its reproduction (mono, stereo, surround, speakers versus headphones, playing with the sound turned down or in public); input from keyboard and mouse via gamepad and touchscreen to motion and voice, vibration as output.
- Degrees of abstraction: from readable symbol to simulated world; symbols, icons, and patterns; environment, objects, and characters; two and three dimensions; what each degree of abstraction affords and costs.
- Style as a decision: building and using references and moodboards; pixel, vector, 3D.
- Visual design: point, line, plane, volume, and texture; composition, framing, and staging; gestalt principles and contrast; colour and light, additive colour and its behaviour on screen; typography (typefaces, sizes, spacing, hierarchy, legibility); motion and timing as visual means.
- Interface and information design in games: screen design and layout; diegetic, non-diegetic, spatial, and meta interface elements; HUD, menus, and navigation; common interaction patterns; feedback; legibility during play.
- Sound: sound and music as bearers of mood, space, and feedback; coherence of image and sound; vocabulary for describing and discussing sound.
- Practice and critique: working on game elements within set parameters and towards a given goal; identifying creative possibilities; giving and taking critique.

LEARNING OUTCOMES / COMPETENCIES

On successful completion of the module, students are able to:

- describe how the audiovisual means of a game - image, typography, colour, light, motion, and sound - work together to shape the player’s experience, and use the appropriate terminology to do so;
- analyse the visual and auditive design of an existing game, name the design decisions behind it, and relate them to the experience the game aims for;
- locate a game on the spectrum between abstract, symbolic representation and simulated game world, and explain what each degree of abstraction affords and costs;
- apply the fundamentals of visual design - composition, gestalt principles, contrast, colour, typography - to their own two-dimensional game material;

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- design readable in-game information: HUD, menus, and feedback, including the distinction between diegetic and non-diegetic interface elements;
- develop a visual style for a given brief and carry it consistently through all elements of that piece of work;
- take the conditions of output and use into account: devices, viewing distances, sound reproduction, and input;
- justify their own design decisions in a critique and give substantiated feedback on the work of others.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

This required elective module of the "Basics" group brings students whose portfolios do not yet demonstrate visual design skills up to the common level required for the programme. It strengthens the aesthetic element of Schell's four elements and enables students to formulate and consistently carry an artistic vision - a prerequisite for integratively shaping the narrative, aesthetic, mechanical, and technological aspects of a game within an interdisciplinary team. Legibility as well as interface and information design anchor visual decisions in the intended experience and in play; tools and techniques remain means to that end. The module primarily contributes to the programme outcomes "craft of game components (emotion)" and "artistic vision" (level 5-6 according to Anderson & Krathwohl).

KEY COMPETENCIES

- Visual analysis and expression using precise design terminology.
- Justifying design decisions towards an audience and the team.
- Giving and receiving critique in open feedback sessions.
- Trained perception and switching between player and designer perspectives.
- Independent, iterative working under self-set and given constraints.

PREREQUISITES

No specific prior knowledge required; the module addresses students who enter without an artistic or design background.

ENTRY REQUIREMENTS

Assignment as one of the three elective-compulsory modules of the "Basics" group individually determined by the examination board (no free choice).

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Solarski, Chris (2012): Drawing Basics and Video Game Art. Classic to Cutting-Edge Art Techniques for Winning Game Design. Watson-Guptill.
- Solarski, Chris (2017): Interactive Stories and Video Game Art. A Storytelling Framework for Game Design. CRC Press.
- Coates, Edd (2026): The Game UI Bible. Lost in Cult.
- Lupton, Ellen (2010): Thinking with Type. 2nd revised edition. Princeton Architectural Press.

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Story and Worldbuilding 101

Coordinator	Max Ackermann
ECTS	5
SWS	4
Type of Course	2 SWS seminar-style lecture and 2 SWS exercises
Frequency	Summer semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Composite examination

ASSESSMENT

- Written exam (90 min)
- Oral exam (30 min)
- Practical coursework

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Game Mechanics 101

Spielmechaniken 101

Code: bMECH · **Subject ID:** bMECH:SU:MGD:, bMECH:Ue:MGD:

Coordinator	Oliver Hofmann
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Single examination

CONTENT

Part III of the programme's core text (Schell, ch. 12-14) serves as a guiding thread: the taxonomy of game mechanics and Schell's lenses as tools for analysis and design review, formally deepened through resource models, probability, and game theory.

- Formal foundations: rules, mechanics, dynamics, aesthetics (MDA framework); formal elements of games; space, time, objects and states, actions, goals, rules.
- Core mechanics, action space, gameplay loops, and progression structures (core loop, meta loop).
- Meaningful choices: risk and reward, expected value, information structures (perfect, imperfect, hidden), chance and skill; perceived versus actual probability.
- Game theory for game design: normal and extensive form, dominant strategies and Nash equilibrium, mixed strategies and intransitive mechanics, zero-sum and non-zero-sum games, cooperation and competition (prisoner's dilemma), sequential games and backward induction; limits of the rational player model.
- Resources and game economies: sources, drains, converters, and trading; positive and negative feedback loops; emergence and progression; modelling with Machinations diagrams.
- Balancing: fairness, symmetric and asymmetric design, cost curves, balancing methodology; reward and punishment as design tools.
- Methods: analysis of existing games; designing mechanics and evaluating them in playtests, building on the Game Design Loop process.

LEARNING OUTCOMES / COMPETENCIES

Students are able to ...

- describe game mechanics using appropriate terminology and analyse games using formal models (MDA, formal elements, Schell's taxonomy of mechanics);
- explain how mechanics generate dynamics through resource flows and feedback loops, and model these relationships;
- evaluate decision situations with regard to information, chance, risk, and expected value;
- model game situations using game theory, determine equilibria, and draw conclusions for balancing and player behaviour;
- analyse game designs using formal models and Schell's lenses, identify weaknesses, and propose well-founded design changes;
- design game mechanics for a given player experience and justify design decisions using formal models and lenses.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The module brings students whose portfolio does not yet demonstrate game design craft - many know mechanics only from the player's perspective - up to the common level required for the programme. Analogue and digital games

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are treated as equally important. It provides the theoretical grounding for the mechanics-related lenses of the programme's core text and makes them methodically applicable. It complements "Game Design Loop" and "Game as a System" and prepares students for the project and for deep dives such as Game Feel and Flow and Level Design. It primarily contributes to the programme outcomes "craft of game components (mechanics)" and "analytical view of games" (level 5-6 according to Anderson & Krathwohl) and supports "player-centric design" (level 3-5).

KEY COMPETENCIES

- Systems thinking.
- Teamwork.
- Giving and receiving feedback in playtests.
- Justifying design decisions.
- Structured design documentation.

PREREQUISITES

No specific prior knowledge required; the module also addresses students who so far know game mechanics only from the player's perspective.

ENTRY REQUIREMENTS

Assignment as one of the three elective-compulsory modules of the "Basics" group individually determined by the examination board (no free choice).

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Individual portfolio: design of an original game mechanic (playable prototype, analogue or digital);
design document justifying design decisions with selected lenses;
formal analysis (Machinations model and game-theoretic or probabilistic analysis);
playtest documentation including iterations.

LITERATURE

- Schell, J. (2020): The Art of Game Design: A Book of Lenses. 3rd edition. CRC Press (core text of the programme, esp. ch. 12–14)
- Adams, E.; Dormans, J. (2012): Game Mechanics: Advanced Game Design. New Riders.
- Salen, K.; Zimmerman, E. (2003): Rules of Play. MIT Press.
- Fullerton, T. (2018): Game Design Workshop. 4th edition. CRC Press.
- Schreiber, I.; Romero, B. (2021): Game Balance. CRC Press.
- Elias, G. S.; Garfield, R.; Gutschera, K. R. (2012): Characteristics of Games. MIT Press.
- Dixit, A.; Nalebuff, B. (2008): The Art of Strategy. W. W. Norton.
- Osborne, M. J. (2004): An Introduction to Game Theory. Oxford University Press.
- Hunicke, R.; LeBlanc, M.; Zubek, R. (2004): MDA: A Formal Approach to Game Design and Game Research. AAAI Workshop.

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"Deep Dives" group (Semesters 2 and 3, 10 ECTS each)

Core Game Design

Game Feel and Flow

Spielgefühl und Flow

Code: mFEEL · **Subject ID:** mFEEL:SU:MGD:, mFEEL:Ue:MGD:

Coordinator	Matthias Hopf
ECTS	2.5
SWS	2
Type of Course	Seminar-style instruction (1 SWS), Practical exercises (1 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	22.5 h contact, 52.5 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module investigates how rules, inputs, uncertainty, and feedback become experiences of control, understanding, tension, competence, and willingness to continue playing. Game feel is the perceived quality of interaction, including responsiveness, weight, agency, clarity, and emotional texture. It applies to real-time games as well as card, turn-based, and puzzle games. Flow is understood as a psychological state of absorbed involvement, not merely an uninterrupted sequence of actions.

- Intended player experience, agency, and the sense of authorship over choices and outcomes.
- Flow conditions and flow breaks: clear proximal goals, interpretable feedback, and the relationship between perceived challenge and skill; limitations of these conditions and other desirable player experiences.
- Randomness, statistical relationships, and perceived probability; input randomness, output randomness, and other forms of uncertainty in their effects on control and tension.
- Intrinsic, extrinsic, and internalized motivation, curiosity, information gaps, and exploration.
- Cognitive load and working memory, learning loops, scaffolding and fading support, error types, and diagnostic feedback.
- Responsiveness, movement feel, inertia, and embodied control; invisible forgiveness and intention-preserving mechanics.

LEARNING OUTCOMES / COMPETENCIES

On successful completion, students can:

- distinguish game feel from flow and analyze their relationships with rules, interaction, feedback, and intended player experience;
- use uncertainty, motivation, cognitive load, and learning processes to explain observed player experiences and critically assess the limits of these explanations;
- formulate design hypotheses about control, clarity, tension, and competence, and investigate them through small comparative prototypes;
- design and evaluate feedback, learning support, and forgiveness mechanisms that account for player intention and different skill levels;
- justify design decisions using playtest findings and relevant literature, without treating flow as guaranteed or as the only measure of quality.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Core Game Design Deep Dive, the module connects the design of games as

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systems with scientifically informed analysis of player experience. It enables students to translate a creative vision into testable interaction decisions and coordinate their implementation with programming, art, and sound. Comparative prototyping and playtesting support reflective design leadership in team projects; technical means serve the experience rather than becoming ends in themselves.

KEY COMPETENCIES

- Analytical thinking and critical use of psychological models.
- Hypothesis-driven experimentation and evidence-informed decision-making.
- Empathy for different abilities and player perspectives.
- Clear communication of experience goals and design trade-offs.
- Self-reflection and responsible treatment of motivation and engagement.

PREREQUISITES

Basic knowledge of game mechanics, iterative prototyping, and playtesting, as developed in Game Design Loop and Game as a System, is recommended; formal completion of these modules is not required.

ASSESSMENT

Oral exam (30 min)

LITERATURE

- Swink, Steve (2009): Game Feel: A Game Designer's Guide to Virtual Sensation. CRC Press. https://www.routledge.com/p/book/9780123743282
- Csikszentmihalyi, Mihaly (2008): Flow: The Psychology of Optimal Experience. Harper Perennial Modern Classics. https://mitpressbookstore.mit.edu/book/9780061339202
- Costikyan, Greg (2013): Uncertainty in Games. MIT Press. https://mitpress.mit.edu/9780262018968/uncertainty-in-games/
- Ryan, Richard M.; Rigby, C. Scott; Przybylski, Andrew (2006): The Motivational Pull of Video Games: A Self-Determination Theory Approach. Motivation and Emotion, 30, 347-363. https://doi.org/10.1007/s11031-006-9051-8
- Sweller, John (1988): Cognitive Load During Problem Solving: Effects on Learning. Cognitive Science, 12(2), 257-285. https://doi.org/10.1207/s15516709cog1202_4
- Loewenstein, George (1994): The Psychology of Curiosity: A Review and Reinterpretation. Psychological Bulletin, 116(1), 75-98. https://doi.org/10.1037/0033-2909.116.1.75

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Pacing and Atmosphere

Coordinator	Matthias Hopf
ECTS	5
SWS	4
Type of Course	2 SWS seminar-style lecture and 2 SWS exercises
Frequency	Winter semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Composite examination

ASSESSMENT

- Written exam (90 min)
- Oral exam (30 min)
- Practical coursework

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Level Design

Leveldesign

Code: mLEVL · **Subject ID:** mLEVL:SU:MGD:, mLEVL:Ue:MGD:

Coordinator	Tilman Zitzmann
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module treats level design as the discipline that unfolds a given setting, given mechanics, and a given story into a sequence of levels. "Level" is understood in the broad sense: spatial worlds, but also puzzle sequences, encounters, unlocks, and other units of progression.

- What level design does: what level design decides and what it inherits from other disciplines; how it relates to setting, story, and mechanics.
- Analysing good levels: reading published levels for structure, guidance, teaching, and rhythm; the level as a teaching device, from the first screen of a platformer to the lock-and-key structure of an adventure.
- Structure and pacing: linear, hub, open, and lock-and-key structures; critical path, optional content, shortcuts, and backtracking; tension curves, rest, encounters, and difficulty over time; introducing, practising, testing, and varying a new element.
- Space and guidance: metrics as the grammar of space - movement, jump, reach, speed, field of view; scale and volume; sightlines and view axes; landmarks, light, and contrast as signposts; guiding without instructing.
- Making and testing levels: blockout in the engine and iteration on it; testing with other people and improving in several iterations.
- Levels for the own project: applying level design to the project prototypes - which levels the project needs, how many, in which order, and how much of it the team can build.

LEARNING OUTCOMES / COMPETENCIES

On successful completion of the module, students are able to:

- explain what level design contributes once setting, story, and mechanics are set, and use the term "level" for spatial worlds as well as for other units of progression;
- analyse existing levels, describe their structure, and name the decisions that guide, teach, and pace the player;
- build levels from the metrics of their game - movement, reach, speed, field of view - and use scale, sightlines, landmarks, light, and contrast to direct attention;
- structure a sequence of levels: introduce, practise, test, and vary an element, and shape tension, rest, and difficulty across the sequence;
- work in blockouts, test them with other people, and improve them in several iterations;
- plan and document the levels their own project needs, and argue for that plan in the team.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Core Game Design deep dive, the module connects the core craft of game design with spatial and dramaturgical design. Levels are where rules, structure, pacing, and experience interact; being able to analyse

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and build them enables students to translate their design vision into playable, testable sections. The module thus strengthens the systemic view of games as experience-generating systems and directly supports the team projects and the creation of fundable prototypes. It primarily contributes to the programme outcomes “player-centric design” and “process- and result-oriented thinking” (level 3-5 according to Anderson & Krathwohl) as well as “craft of game components” (level 5-6).

KEY COMPETENCIES

- Spatial and structural thinking in sequences and rhythms.
- Analytical reading and description of player experience.
- Iterative blockout work with playtest-based feedback.
- Arguing for and defending design plans within the team.
- Realistic assessment of scope and feasibility.

PREREQUISITES

No specific prior knowledge required. Basic knowledge of game mechanics, iterative prototyping, and playtesting, as developed in Game Design Loop and Game as a System, is recommended; formal completion of these modules is not required.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Totten, Christopher W. (2019): An Architectural Approach to Level Design. 2nd edition. CRC Press.
- Kremers, Rudolf (2009): Level Design. Concept, Theory, and Practice. A K Peters.
- Totten, Christopher W. (ed.) (2017): Level Design. Processes and Experiences. CRC Press.
- Yang, Robert: The Level Design Book. https://book.leveldesignbook.com

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Procedural World Design

Prozedurales Weltdesign

Code: mPROC · **Subject ID:** mPROC:SU:MGD:, mPROC:Ue:MGD:

Coordinator	Matthias Hopf
ECTS	2.5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	22.5 h contact, 52.5 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module approaches procedural world design as the creation of rules and processes that produce spatial, ecological, and narrative content. Its starting point is the intended player experience, rather than the quantity of generated content or technical complexity. Students investigate the interplay of variation, coherence, and authorial control, and how generated worlds can be evaluated through play.

- Randomness and spatially correlated noise: distinctions, reproducibility, parameters, and the design properties of different noise types.
- Families of landscape generation methods, including multiscale noise, erosion models, Fourier synthesis, and fractal subdivision such as Diamond-Square.
- Generation and rule-based placement of plants, ecosystems, and buildings; spatial relationships, legibility, and ecological plausibility.
- Randomness-based, noise-based, knowledge-based, and language-model-assisted approaches to backstories, non-player characters, worldbuilding, quests, and puzzles.
- Combining generated structures with authored content; constraints, dependencies, and designer interventions to support coherence, playability, and solvability.
- Small comparative prototypes and playtests to assess diversity, orientation, and experience quality; limitations of generative methods, particularly the reliability, explainability, and controllability of language models.

LEARNING OUTCOMES / COMPETENCIES

On successful completion, students can:

- distinguish randomness from noise and analyze their properties in relation to design intentions and reproducible variation;
- select suitable families of methods for spatial, ecological, and narrative generation tasks and justify their limitations;
- translate experience goals into generation rules, parameters, and constraints, and investigate them through manageable prototypes;
- critically assess generated content for coherence, legibility, diversity, and playability, and derive revisions from their findings;
- weigh knowledge-based systems and language models against alternative approaches, including required validation and responsibility for the overall creative vision.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Core Game Design Deep Dive, the module develops an understanding of game worlds as interconnected systems. It integrates mechanical, narrative, aesthetic, and technological decisions within an overall creative vision.

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Students learn to use generative methods purposefully to create player experiences, estimate the effort involved, and evaluate results through playtesting. The module supports independent design decisions and the interdisciplinary development of viable prototypes without requiring specialization in engine development or runtime optimization.

KEY COMPETENCIES

- Systems thinking and abstraction of design goals into rules.
- Creative exploration and methodical comparison of approaches.
- Critical evaluation of automated outputs and responsible use of AI.
- Communication across game design, narrative design, art, and programming.
- Prioritization, effort estimation, and reflective handling of uncertainty.

PREREQUISITES

Basic knowledge of game mechanics and worldbuilding, and the ability to create simple playable prototypes with suitable tools, are recommended; knowledge developed in Game as a System and Game Engine 101 is helpful, but formal completion of these modules is not required.

ASSESSMENT

Oral exam (30 min)

LITERATURE

- Shaker, Noor; Togelius, Julian; Nelson, Mark J. (2016): Procedural Content Generation in Games: A Textbook and an Overview of Current Research. Springer. https://doi.org/10.1007/978-3-319-42716-4. Author versions: https://www.pcgbook.com/
- Short, Tanya X.; Adams, Tarn (eds.) (2017): Procedural Generation in Game Design. A K Peters/CRC Press. https://www.routledge.com/p/book/9781498799195
- Perlin, Ken (2002): Improving Noise. ACM Transactions on Graphics, 21(3), 681-682. https://doi.org/10.1145/566654.566636
- Farrokhi Maleki, Mahdi; Zhao, Richard (2024): Procedural Content Generation in Games: A Survey with Insights on Emerging LLM Integration. Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment, 20(1), 167-178. https://doi.org/10.1609/aiide.v20i1.31877

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Game Development

Game Audio

Code: mAUD · **Subject ID:** mAUD:SU:MGD:, mAUD:Ue:MGD:

Coordinator	Alexander von Hoffmann
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module covers the design and implementation of sound for digital games and interactive media - from nonlinear sound design to interactive audio systems inside the game engine.

- Fundamentals of nonlinear sound design.
- Foley and ambience: recording, editing, organising, and implementing sounds and environmental ambiences.
- Spatial audio: established spatialisation and rendering techniques and their suitability for concrete applications.
- Dynamic mixing: systems that respond to player actions and changes in the game state.
- Authoring and workflow in audio middleware; structuring and managing interactive audio systems.
- Implementation of spoken language, sound drones, noises, and interactive music.
- Testing, evaluating, and optimising game-audio implementations from technical, aesthetic, and perceptual perspectives.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of the module, students will be able to:

- explain the fundamental principles of nonlinear sound design for digital games and interactive media;
- analyse the dramaturgical and functional roles of sound within interactive applications;
- record, edit, organise, and implement Foley sounds and environmental ambiences;
- explain and apply established spatial-audio techniques in interactive environments and assess the suitability of different spatialisation and rendering methods for specific applications;
- design dynamic mixing systems that respond appropriately to player actions and changes in the game state;
- use audio middleware to author, structure, and manage interactive audio systems;
- implement spoken language, sound drones, noises, and interactive music in a game environment;
- test, evaluate, and optimise game-audio implementations from technical, aesthetic, and perceptual perspectives;
- document and present an interactive audio concept using appropriate professional terminology.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Game Development deep dive, the module strengthens the aesthetic element of Schell's tetrad for projects that genuinely need sound as part of the experience. It enables teams to design, implement, and evaluate interactive audio in their prototypes and vertical slices, and thereby

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raises the perceived quality of the programme's proof of concept. Sound is treated as a design means that serves the experience - latency, mixing, and technical constraints are design decisions. The spatial-audio and human-machine-communication competencies taught also open career paths beyond games, such as UX and interactive sound in media, mobility, and industry.

KEY COMPETENCIES

- Aesthetic judgement in perception-driven (sound) design.
- Combining creative and technical work in one implementation workflow.
- Systematic testing and evaluation from technical, aesthetic, and perceptual perspectives.
- Documentation and presentation using professional terminology.
- Interdisciplinary communication between sound, design, and development.

PREREQUISITES

No specific prior knowledge required; basic familiarity with a game engine and an interest in sound and sound production are helpful.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Zdanowicz, Gina; Bambrick, Spencer (2021): The Game Audio Strategy Guide: A Practical Course. Routledge.
- Sinclair, Jean-Luc (2020): Principles of Game Audio and Sound Design. Routledge.
- Ten interactive courses on game audio in the online repository of Virtuelle Hochschule Bayern (vhb).

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Game Engine Development

Code: mEDEV · **Subject ID:** mEDEV:SU:MGD:, mEDEV:Ue:MGD:

Coordinator	Stephan Rehfeld
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Duration	1 semester(s)
Workload	50 h contact, 100 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module conveys the structure, functioning, and architecture of game engines and enables students to program a small engine themselves.

- History of game engines, their evolution, and current trends.
- The game loop.
- Input and output in interactive real-time applications; soft real-time requirements of interactive real-time applications.
- Working principles of typical components of a game engine.
- How a renderer works (2D and 3D).
- How a real-time physics simulation works.
- How an animation system works.
- How NPC AI works.
- Integrating scripting languages for controlling content.
- Game engine architectures and the architectural decisions of the middleware layer.
- Parallelisation and concurrency in game engines.
- Profiling and performance optimisation.
- Practical implementation: designing and building an own small game engine with a unique feature.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- describe the history of game engines, their evolution, and current trends;
- understand the components of a game engine;
- understand the architectural decisions of the middleware layer of a game engine;
- explore and analyse an existing game engine in depth;
- program a small game engine themselves.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Game Development deep dive, the module deepens the understanding of what a game engine actually is: students who encountered scene graphs, nodes, state machines, and signals as users in the core programme now examine these systems in depth. They learn how rendering, physics, animation, and AI interact within an engine and can assess the effort of technical decisions. The module thus works in both directions: it prepares students to communicate with engine developers as equals and it opens the perspective of contributing genuine technical innovation to their game project, such as an own engine feature in a vertical slice.

KEY COMPETENCIES

- Systemic understanding of complex software architectures.
- Independent conception and implementation of a substantial software project.
- Analysing and assessing performance bottlenecks (profiling).

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- Contextualising technical trends and their limitations.

PREREQUISITES
Computer science fundamentals.

ASSESSMENT
Practical coursework

ASSESSMENT DETAILS
Details will be announced during the first two weeks of the course

LITERATURE

- Gregory, Jason (2018): Game Engine Architecture. 3rd edition. CRC Press.
- Akenine-Möller, Tomas; Haines, Eric; Hoffman, Naty (2018): Real-Time Rendering. 4th edition. CRC Press.
- Millington, Ian (2019): Game Physics Engine Development: How to Build a Robust Commercial-Grade Physics Engine for your Game. 2nd edition. CRC Press.
- Russell, Stuart; Norvig, Peter (2021): Artificial Intelligence: A Modern Approach. 4th edition. Pearson.

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Multimodal Interaction

Multimodale Interaktion

Code: mMMI · **Subject ID:** mMMI:Pr:MGD:

Coordinator	Ralph Lano
ECTS	5
SWS	4
Type of Course	Practical course (4 SWS)
Frequency	Winter semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module covers the design and implementation of interactive systems that combine multiple input and output modalities, including vision, audio, body movement, touch, physical sensors, language, generative media, and actuation.

- Foundations of multimodal interaction: interaction as a sensing-interpretation-decision-action loop; modalities and their affordances; complementary and redundant modalities; continuous versus discrete interaction; embodied and spatial interaction.
- Perception and sensing: cameras, microphones, and physical sensors; classical computer vision and signal processing; human pose, hand, and face tracking; object detection and segmentation; speech and audio processing; sensor and modality fusion.
- From signals to interaction: feature extraction, recognition, classification, and mapping; temporal filtering, smoothing, hysteresis, and state; gesture and action recognition; coordinate systems, calibration, and spatial mapping.
- AI-supported interaction: learned perception, multimodal models, and generative systems as components of interactive applications; appropriate division between deterministic real-time processing and model-based interpretation or generation; latency, unpredictability, and fallback strategies.
- Interactive system architecture: modular pipelines, intermediate representations, event-driven processing, communication between components and external systems; integration with game engines, audiovisual environments, OSC/MIDI/networked devices, and physical actuators.
- Prototyping multimodal experiences: rapid experiments combining multiple modalities; iterative implementation and testing; exploration of novel forms of play, embodied interfaces, installations, and alternative controllers.
- Evaluation and research practice: from project idea to research question; related-work search and positioning; technical evaluation and user studies; experimental design, observations, questionnaires, and interaction data; limitations and responsible interpretation of results.
- Academic communication: documentation of system architecture, design rationale, and evaluation; preparing figures, video demonstrations, and concise research narratives; presentation and critique of work in a poster/demo-style format.

LEARNING OUTCOMES / COMPETENCIES

On successful completion of the module, students are able to:

- analyse and design interactive systems that combine multiple input and output modalities, including vision, audio, body movement, touch, physical sensors, language, generative media, and actuation;

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- select appropriate deterministic, signal-processing, and machine-learning methods for a given interaction problem and justify these choices with respect to latency, robustness, controllability, and user experience;
- design modular real-time interaction pipelines from sensing and interpretation through state, decision-making, and output;
- prototype multimodal interaction concepts using contemporary tools and frameworks, integrating components such as computer vision, pose and gesture tracking, speech processing, generative AI, game engines, and networked devices;
- identify and address practical problems of interactive systems, including noise, uncertainty, temporal stability, latency, calibration, failure states, and conflicting modalities;
- formulate an interaction concept as a research or design question and develop an appropriate prototype to investigate it;
- plan and conduct a small-scale user study or technical evaluation, collect appropriate qualitative and/or quantitative data, and critically interpret the results;
- document and communicate the resulting work in a concise academic format suitable as the basis for a research poster, demo, short paper, or comparable publication-oriented contribution.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Game Development deep dive, the module provides technical specialisation for projects that genuinely need it: embodied, spatial, and sensor-based interaction beyond screen and standard input. It combines technical prototyping with scientific evaluation practice and thus prepares students for Game Science and the master's thesis; its academic communication format (poster, demo, short paper) supports the programme's publication orientation. It also opens career paths beyond games, such as UX and interaction design for museums, trade fairs, or automotive. Technical depth remains tied to the design question: latency, robustness, and controllability are treated as design decisions, not as ends in themselves.

KEY COMPETENCIES

- Integrating heterogeneous technical components into one system.
- Hypothesis-driven prototyping and iterative testing with people.
- Research practice: problem formulation, evaluation, and critical interpretation of data.
- Academic communication in concise formats.
- Responsible use of AI components and awareness of their limitations.

PREREQUISITES

No specific prior knowledge required; basic programming skills and familiarity with a game engine are helpful.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Oviatt, Sharon; Cohen, Philip (2015): The Paradigm Shift to Multimodality in Contemporary Computer Interfaces. Morgan & Claypool.
- Dix, Alan; Finlay, Janet; Abowd, Gregory; Beale, Russell (2004): Human-Computer Interaction. 3rd edition. Pearson.
- Buxton, Bill (2007): Sketching User Experiences: Getting the Design Right and the Right Design. Morgan Kaufmann.
- Norman, Don (2013): The Design of Everyday Things. Revised edition. Basic Books.
- Selected current research papers from ACM CHI, ACM TEI, ACM UIST, and related venues.

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Simulation + Rendering

Simulation und Rendering

Code: mSIM · **Subject ID:** mSIM:SU:MGD:, mSIM:Ue:MGD:

Coordinator	Stefan Röttger
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module provides insight into practical simulation and rendering techniques and their combination within commonly used game engines. Application examples include real-time simulations, open-world scenarios, and real-world visualisations.

- Real versus game physics.
- Spatial algorithms and data structures.
- Physics engines.
- Rigid-body and soft-body simulations.
- Ray tracing and path tracing.
- Graphics hardware (OpenGL, Vulkan).
- Real-time rendering techniques.
- Geo-spatial data.
- Scanner technology (Landsat, Lidar).
- Level-of-detail algorithms.
- Volumetric effects.
- Particle systems.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- use a physics engine;
- implement a prototypical game with integrated physics simulation;
- understand the physics of real-world n-body dynamics;
- assess the requirements of real-world physics simulations;
- choose appropriate spatial data structures and algorithms for simulations;
- understand the physics of light transport for global illumination;
- implement a ray tracer as an example for global illumination;
- choose appropriate simulation and rendering algorithms for global illumination;
- give an overview of acquisition and rendering algorithms for real-world data;
- understand level-of-detail algorithms for real-time rendering;
- understand large-scale simulation and rendering requirements for open-world games;
- assess the complexity and efficiency of these techniques for game development.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Game Development deep dive, the module provides technical specialisation for projects that genuinely require demanding simulation and rendering: physics-based interaction, open-world scenarios, and realistic visualisation. Students learn to assess the effort, complexity, and limitations of technical methods and to weigh their use against an

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overall creative vision. The design competence built in the core programme is thus complemented by the ability to converse with developers as equals about feasibility, cost, and trade-offs. Application examples extend beyond games into serious games, simulations, and the visualisation of real geo-spatial data.

KEY COMPETENCIES

- Algorithmic thinking and selection of suitable methods and data structures.
- Assessing the complexity and efficiency of technical solutions.
- Integrating simulation and rendering into existing engine architectures.
- Weighing technical possibilities against design goals.

PREREQUISITES

Knowledge and practical experience from Game Engine 101.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Akenine-Möller, Tomas; Haines, Eric; Hoffman, Naty (2018): Real-Time Rendering. 4th edition. CRC Press. https://www.realtimerendering.com/
- Pharr, Matt; Jakob, Wenzel; Humphreys, Greg (2023): Physically Based Rendering: From Theory to Implementation. 4th edition. MIT Press. https://www.pbr-book.org/
- Hughes, John F.; van Dam, Andries; McGuire, Morgan; Sklar, David F.; Foley, James D.; Feiner, Steven K.; Akeley, Kurt (2013): Computer Graphics: Principles and Practice. 3rd edition. Addison-Wesley.
- Gregory, Jason (2018): Game Engine Architecture. 3rd edition. CRC Press.
- Millington, Ian (2019): Game Physics Engine Development: How to Build a Robust Commercial-Grade Physics Engine for your Game. 2nd edition. CRC Press.

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3D Design

Code: m3D · **Subject ID:** m3D:SU:MGD:, m3D:Ue:MGD:

Coordinator	Manuel Casasola Merkle
ECTS	2.5
SWS	2
Type of Course	Seminar-style instruction (1 SWS), Practical exercises (1 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	22.5 h contact, 52.5 h self-study
Language	English
Examination Type	Single examination

CONTENT

The module covers the workflow from creating game-ready 3D assets in a 3D content creation package (Blender) to integrating them into the game engine (Godot). Its focus lies on modelling, UVs and baking, PBR texturing, materials and shaders, animation, and lighting and performance in the context of real-time rendering.

- Blender fundamentals: interface and navigation.
- Modelling for real time: primitives and box modelling, topology, the high-to-low workflow, and triangle budgets.
- UVs and baking: seams, texel density, trim sheets, normal maps, tangent space, ambient occlusion.
- Texturing and PBR: metallic-roughness workflow, albedo discipline, sRGB versus linear data, channel packing (ORM).
- Materials and shading in the game engine; a simple custom shader and the core constraints of real-time rendering.
- Animating the assets.
- The import pipeline: glTF export and the import dock; moving assets from authoring in the DCC into the engine.
- Modular kits: assembling props into reusable building blocks.
- Lighting and environment: light types, baked versus real-time lighting, WorldEnvironment.
- Performance and profiling: diagnosing basic performance issues.

LEARNING OUTCOMES / COMPETENCIES

Upon successful completion of this module, students will be able to:

- model simple, game-ready assets in a 3D content creation package like Blender;
- build clean, non-overlapping UVs for baking and hold every asset to a consistent, project-wide texel density;
- bake high-poly detail down to a low-poly mesh and author textures using the metallic-roughness PBR workflow;
- set up materials inside the game engine and write a simple custom shader, understanding the core constraints of real-time rendering;
- animate the assets and apply the import pipeline to move assets between authoring in the DCC and the engine;
- assemble props into modular kits;
- diagnose basic performance issues;
- explain how asset-creation workflows for real-time engines differ structurally from offline or pre-rendered 3D work.

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CONTRIBUTION TO THE PROGRAMME OBJECTIVES

As a Game Development deep dive, the module connects the aesthetic element of Schell's tetrad with the technical realisation inside the engine. It enables students to create game-ready 3D assets independently and to integrate them into the prototypes and team projects, and sharpens the sense of what design decisions in modelling, texturing, and lighting cost in computation time and iteration speed. It thus supports the programme's fast iteration cycles and its fundable proof of concept. The pipelines and terms taught (topology, texel density, PBR, glTF) are also the vocabulary with which art and development collaborate across disciplinary boundaries. Real-time limits are treated as design decisions - runtime optimisation remains tied to the design question.

KEY COMPETENCIES

- Tool fluency in professional software (Blender, Godot).
- Structured, pipeline-oriented handling of assets.
- Estimating the cost (time, performance, detail) of design decisions.
- Interdisciplinary communication between art and development.
- Quality awareness and iterative refinement under real-time constraints.

PREREQUISITES

No specific prior knowledge required; basic familiarity with a game engine is helpful.

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Details will be announced during the first two weeks of the course

LITERATURE

- Godot Engine Documentation. Godot Engine contributors. https://docs.godotengine.org/
- Blender Manual. Blender Foundation. https://docs.blender.org/manual/
- Akenine-Möller, Tomas; Haines, Eric; Hoffman, Naty (2018): Real-Time Rendering. 4th edition. CRC Press.
- Lengyel, Eric (2019): Foundations of Game Engine Development, Volume 2: Rendering. Terathon Software LLC.

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Massively Multiplayer Online (MMO) Games: Technology and Design

Massively Multiplayer Online (MMO) Games: Technologie und Design

Coordinator	Ingo Scholz
ECTS	5
SWS	4
Type of Course	Block course with prototype implementation in project teams
Frequency	Summer semester
Duration	1 semester(s)
Workload	50 h contact, 100 h self-study
Language	English
Examination Type	Single examination

CONTENT

Massively multiplayer online games combine in their development a large number of technologies from computer science and many other disciplines. In this module, the focus is placed on the information technology aspects, but topics from other areas are also addressed. The module content covers, among others, the following topics with a focus on game development:

- Network technologies and cloud applications
- Authoritative servers and decentralized services
- State synchronization in real-time games
- Security and data protection aspects in handling players and player data
- Location-based gaming as a special application of online games

LEARNING OUTCOMES / COMPETENCIES

Understanding the complexity of projects in the area of MMO games; overview of the necessary technologies and qualifications in the development team; acquisition of basic skills in the most important technological aspects of MMO game development.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The module directly supports the goal of imparting knowledge in the area of distributed and networked systems in a practical application of media informatics.

KEY COMPETENCIES

Independent acquisition of new knowledge and its application, capacity for abstraction and communication as well as teamwork.

PREREQUISITES

Fundamentals of practical computer science such as computer communication, software engineering, and databases

ASSESSMENT

Practical coursework

LITERATURE

Glazer, Josh, and Madhav, Sanjay: Multiplayer Game Programming: Architecting Networked Games, New York, Nov. 2015 – Addison-Wesley Professional. ISBN-13: 978-0-13-403430-0

Ignatchenko, Sergey: Development and Deployment of Multiplayer Online Games, Vol. I, 2017, ISBN-13: 978-3903213050

Schell, Jesse: The Art of Game Design: A Book of Lenses, Taylor & Francis, Nov. 2014 (2. Auflage). ISBN-13: 978-1466598645

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Theory

Gamification of Information and Application Systems

Gamification von Informations- und Anwendungssystemen

Coordinator	Thomas Voit
ECTS	5
SWS	4
Type of Course	Lecture with practical exercises and presentation
Frequency	Winter semester
Duration	1 semester(s)
Workload	65 h contact, 85 h self-study
Language	English
Examination Type	Single examination

CONTENT

Theoretical foundations: Psychological theories of motivation regarding the effect of motivational incentive systems Gamification frameworks for the use of game forms, game elements, and player types Gamification patterns: Identification and description of motivating game mechanisms as generic design patterns (Gamification Patterns) Process model for applying the design patterns to the design of motivating information and application systems Practical exercise and presentation: Critical analysis of gamified information and application systems in various domains

Design of one's own gamified information or application system using the identified Gamification Patterns

LEARNING OUTCOMES / COMPETENCIES

Identifying and describing motivating game mechanics and acquiring the ability to critically evaluate and select these mechanics with regard to their effect and suitability, in order to design more motivating information and application systems

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The identification and description of motivating game mechanisms as generic design patterns fosters the capacity for abstraction and analytical skills. The application of generic design patterns enables the design of innovative application concepts and systems that aim at sustained user motivation.

KEY COMPETENCIES

Capacity for abstraction and analytical ability through the identification and description of motivating game mechanisms as generic design patterns
Social competence through the examination of the effects of motivational incentive mechanisms on different player types

PREREQUISITES

Fundamentals of Information Systems, Software Engineering

ASSESSMENT

- Written exam (90 min)
- Oral exam (30 min)
- Practical coursework

LITERATURE

Burke, B.: Gamify. How Gamification motivates people to do extraordinary things, Brookline (Bibliomotion) 2014.
Cooper, A.; Reimann, R.; Cronin, D.: About Face. Interface und Interaction Design, Heidelberg (mitp) 2010.

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Dignan, A.: Game Frame. Using Games as a Strategy for Success, New York (Free Press) 2011.
Hugos, M.: Enterprise Games. Using Game Mechanics to Build a Better Business, Chigaco (Center for Systems Innovations) 2012.
Huizinga, J.: Homo Ludens. Vom Ursprung der Kultur im Spiel, Reinbek (Rowohlt) 1987.
Janaki, K.; Herger, M.: Gamification at Work. Designing Engaging Business Software, o.O. (Interaction Design Foundation) 2013.
Kapp, K. M.: The Gamification of Learning and Instruction. Game-Based Methods and Strategies for Training and Education, San Francisco (Wiley) 2012.
Kapp, K. M.; The Gamification of Learning and Instruction Fieldbook. Ideas into Practice, San Francisco (Wiley) 2014.
McGonigal, J.: Besser als die Wirklichkeit. Warum wir von Computerspielen profitieren und wie sie die Welt verändern, München (Heyne) 2012.
Reeves, B.; Read, J. L.: Total Engagement. Using Games and Virtual Worlds to Change the Way People Work and Businesses Compete, Boston (Harvard Business Press) 2009.
Wendel, S.: Designing for Behavioural Change. Applying Psychology and Behavioural Economics, Sebastopol (O'Reilly) 2014.
Werbach, K.; Hunter, D.: For the Win. How Game Thinking can revolutionize your Business, Philadelphia (Wharton) 2012.
Zichermann, G.; Linder, J.: The Gamification Revolution. How leaders leverage game mechanics to crush the competition, New York (McGraw Hill) 2012.

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Serious Games

Coordinator	Thomas Voit, Baumgarten
ECTS	5
SWS	4
Type of Course	2 SWS seminar-style lecture and 2 SWS exercises
Frequency	Winter semester
Duration	1 semester(s)
Workload	56 h contact, 94 h self-study
Language	English
Examination Type	Composite examination

ASSESSMENT

- Written exam (90 min)
- Oral exam (30 min)
- Practical coursework

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Related Knowledge

Management and Leadership

Management und Leadership

Code: mMAN · **Subject ID:** mMAN:SU:MGD:, mMAN:Ue:MGD: · **prerequesits:** {'de': 'Keine besonderen fachlichen Vorkenntnisse erforderlich.', 'en': 'No specific prior knowledge required.'}

Coordinator	Markus Kaiser
ECTS	5
SWS	4
Type of Course	Seminar-style instruction (2 SWS), Practical exercises (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Single examination

CONTENT

- Goals of management and leadership
- Leadership styles and models
- New leadership roles
- Digital leadership
- Innovation management with Design Thinking and Lean Startup
- Project management
- Change management with change leadership
- The four levels of New Work

LEARNING OUTCOMES / COMPETENCIES

Students know the basic functions of management and leadership and are able to apply them. They are able to reflect on the different leadership styles that can be applied. They know the principles of digital leadership. On the basis of various models, they are able to design and evaluate change-management measures. They know the fundamentals of project management and are able to use these tools to plan a project. They know the fundamentals of innovation management as well as the phases of a design thinking workshop and of Lean Startup. They know the four levels of New Work.

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

The module offers a framework of how organisation and leadership in a (game) company influence the development of games.

KEY COMPETENCIES

- Methodological competence
- Presentation
- Argumentation
- Discussion

ASSESSMENT

Practical coursework

ASSESSMENT DETAILS

Practical coursework

LITERATURE

- Ackerman, L. S. (2023). Development, Transition, or Transformation: The Question of Change in Organizations. Organization Development Review, 55(1).
- Kotter, J. P., Akhtar, V., & Gupta, G. (2021). Change: How organizations achieve hard-to-imagine results in uncertain and volatile times. John Wiley & Sons.

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- Al Khajeh, E. (2018). Impact of Leadership Styles on Organizational Performance. Journal of Human Resources Management Research, Vol. 2018 (2018).
- Dombrowski, H., & Bogs, N. (2020). Digital-Leadership-Index–Führung im digitalen Umfeld anschaulich und messbar machen. Digitale Transformation in der Unternehmenspraxis: Mindset–Leadership–Akteure–Technologien, 103-125.
- Duwe, J. (2016). Ambidextrie, Führung und Kommunikation: Interne Kommunikation im Innovationsmanagement ambidexter Technologieunternehmen. Springer-Verlag.
- Faraz, N. A., Ahmed, F., & Xiong, Z. (2024). How firms leverage corporate environmental strategy to nurture green behavior: Role of multi-level environmentally responsible leadership. Corporate Social Responsibility and Environmental Management, 31(1), 243-259.

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Technology Ethics

Code: TE · **Subject ID:** TE:SU:MIAS:, TE:Ue:MIAS:

Coordinator	Timo Jakobi
ECTS	2.5
SWS	4
Type of Course	seminaristischer Unterricht (2 SWS), Übung (2 SWS)
Frequency	Summer semester
Duration	1 semester(s)
Workload	24 h contact, 51 h self-study
Language	English
Examination Type	Single examination

CONTENT

- Foundations of ethics: major ethical theories and decision-making frameworks
- Principles of responsible AI: fairness, accountability, transparency, and explainability (FATE)
- Ethical aspects of AI design: value-sensitive design, participatory design, and human in the loop
- Algorithmic bias and discrimination: causes, impacts, and mitigation strategies
- Human autonomy and agency in human-AI interaction and ethics of autonomous systems

LEARNING OUTCOMES / COMPETENCIES

- Identify and critically reflect on key ethical challenges arising from the development and deployment of intelligent and autonomous systems.
- Understand and explain relevant ethical theories and apply them to real-world scenarios involving AI.
- Evaluate the social, legal, and moral implications of intelligent systems with regard to accountability, transparency, bias, human autonomy, and data privacy.
- Analyse debates in AI ethics from interdisciplinary perspectives.
- Propose ethically informed approaches to the design, development, and governance of AI systems.
- Communicate complex ethical issues in a clear, structured, and responsible manner to both technical and non-technical audiences.

ASSESSMENT

Practical coursework

LITERATURE

Basic Literature:

- Bostrom, N. (2014). Superintelligence: Paths, Dangers, Strategies. Oxford University Press.
- Mittelstadt, B. et al. (2016). “The ethics of algorithms: Mapping the debate.” Big Data & Society, 3(2).
- Jobin, A., Ienca, M., & Vayena, E. (2019). “The global landscape of AI ethics guidelines.” Nature Machine Intelligence, 1(9), 389–399.
- Floridi, L. (2013). The Ethics of Information. Oxford University Press.
- Dignum, V. (2019). Responsible Artificial Intelligence: How to Develop and Use AI in a Responsible Way. Springer.

Recommended Reading:

- Cave, S., Dihal, K., & Dillon, S. (2020). AI Narratives: A History of Imaginative Thinking About Intelligent Machines. Oxford University Press.
- Ashok, Mona, et al. “Ethical framework for artificial intelligence and digital technologies.” International Journal of Information Management 62 (2022): 102433.

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Knowledge-based Game Development Techniques

Wissensbasierte Games-Entwicklungstechniken

Coordinator	Bartosz von Rymon Lipinski
ECTS	5
SWS	4
Type of Course	Lecture, seminar, project work
Frequency	Winter semester
Duration	1 semester(s)
Workload	45 h contact, 105 h self-study
Language	English
Examination Type	Composite examination

CONTENT

1. Theoretical classification (Game AI + knowledge-based systems, development systems for games and Interactive Fiction (IF) + world/story

description languages)

1. Practical introduction to “knowledge-based games development” (with the C++-based research prototype “Knowledge Engine”)
2. Presentation and knowledge-based software implementation of selected techniques from the games area:
3. Basic world modeling and technical game design (using the example of text adventures / text RPGs)
4. Interaction and more complex game mechanics in dynamic game worlds (using the example of digital gamebooks)
5. Basic Game AI techniques for NPC behavior control (e.g. FSMs, behavior trees, utility-based AI)
6. Advanced Game AI techniques for NPC control (in particular exploration and navigation in virtual game worlds)
7. Example integration of the above-mentioned techniques into a game engine (as a “Game AI Plugin”)
8. Summary, discussion + outlook (including with regard to further application fields outside of games)
9. Building on this, implementation, combination and transfer of the presented techniques in an own IF/games application fragment (project work)

LEARNING OUTCOMES / COMPETENCIES

Competence to explain and evaluate knowledge-based approaches to software modeling and simulation of virtual, interactive worlds. Knowledge regarding the knowledge-based design of fundamental methods for behavior control of AI agents (“non-player characters”). Skills for prototype implementation of knowledge-based architectures and methods, as well as integration of these into an existing application framework (e.g. GUI framework, game engine, etc.)

CONTRIBUTION TO THE PROGRAMME OBJECTIVES

Conveying knowledge from applied and practical computer science in the application field of software development, technical world design and computer game AI. Subject-specific specialization and transfer between interlinked subject areas, in particular software engineering, knowledge engineering and games engineering. Ability to scientifically classify complex interactive and AI-based applications, to conceive them theoretically and to implement or extend them with application reference.

KEY COMPETENCIES

Analysis and classification of problems, creative problem solving, independent work, communication and teamwork skills.

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PREREQUISITES

Basic requirements are theoretical and practical experience in the field of software development (object-oriented modeling, programming language paradigms, qualities and principles of software engineering) and an affinity for the field of computer game development and interactive storytelling. Advantageous are basic knowledge of programming in C++ as well as fundamentals of classical (symbolic) AI (in particular agent systems, logic, knowledge representation, decision-making methods).

Since this course also includes approaches of a constructivist-oriented teaching format (cf. "research-based learning"), in which selected problem statements, solution approaches, and corresponding applications are addressed directly from research, a corresponding "technological openness" is expected (e.g.

working with research prototypes still far from product maturity).

ASSESSMENT

Practical coursework

LITERATURE

1. Heiko Kalista: C++ für Spieleprogrammierer, Carl Hanser Verlag GmbH & Co. KG
2. Stuart Russell, Peter Norvig: Artificial Intelligence - A Modern Approach, Pearson
3. Ian Millington: AI for Games, CRC Press
4. Christoph Beierle, Gabriele Kern-Isberner: Methoden wissensbasierter Systeme,

Springer Vieweg

1. Jeff Hawkins, Sandra Blakeslee: On Intelligence, Owl Books
2. Chris Bradfield: Godot 4 Game Development Projects, Packt Publishing

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