Faculty HW

Module Descriptions

Master of Science (M. Sc.)

Educational Technology

Version ##.##. 2019

SAARLAND
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1. Objective

The course of study Educational Technology aims at understanding theories and practices of Educational Technology for the design, development, application, management, evaluation and exploration of (technology-enhanced) learning arrangements.

The master program Educational Technology addresses undergraduates of Computer Science (Informatics, Media Informatics, Programming, or Engineering) and Social Sciences (Education, Pedagogy, Media Education, or Psychology). In this master's program, students of these and related Bachelor backgrounds are encouraged to share their respective knowledge and methodical expertise.

Furthermore, students acquire theoretical and practical knowledge in the area of technology-supported communication and knowledge management, which qualifies them for management and design tasks for knowledge- and technology-related processes in organizations. Students also acquire skills for developing multi-media knowledge communication and instruction, for developing software, and for conducting and understanding empirical research.

The English-language, international master's program strongly builds on international research on the topic of Educational Technology.

2. Glossary

This manual describes all the modules of the program "Educational Technology (M. Sc.)". Each module description includes information about the following points:

- *Name* of the module;

- *Abbreviation*: Identification number of the module;

- Recommended *semester* registering for the respective module (Recm);

- Period of time in which the module is completed within the standard study period;

- *Regular cycle* of the course, with corresponding semester if applicable (WS – winter term, SS – summer term);

- Required number of semesters for accomplishing the module (*duration);*

- Semester periods per week (*SWS - Semesterwochenstunden*);

- Attainable credit points (CP);

- *Module responsible:* contact person or coordinator for the course;

- *Lecturer:* instructor responsible for the module;

- *Allocation in the curriculum*: classification of the module as (general or specific) compulsory, optional compulsory, or elective;

- *Admission requirements*: specific requirements and demands for the participation in module examinations. If applicable, which modules need to be successfully completed beforehand;

- *Assessed Performance*: specifications about the type of graded or ungraded examination (written exam, oral exam, term paper, report, presentation, etc.);

- *Lectures/seminars*: list of the lectures and seminars to be completed in the module, including information about the semester periods per week (weekly hours) and, if applicable, the participant limit;

- *Workload of the elements of the module*: the workload includes the attendance time in the lectures, self-study, preparation and follow-up of meetings or events, exam preparation, creation of research and final projects and similar relevant activities;

- *Module grade* (in accordance with the examination regulations);

- *Learning goals and competencies*: by means of the learning and qualification objectives, description of the main competencies (e.g. specialized, methodological, interdisciplinary) and key skills (e.g. communicative, social, linguistic);

- *Content of the module*: Content orientation of the module.

3. Structure and contents of the program

The master's program Educational Technology comprises of overall 120 credit points of compulsory, optional compulsory and elective courses within the following modules:

1. Compulsory modules:
- "EduTech" (14 CP)
- "Learning with Media" (12 CP)
- "Design" (12 CP)
- "Methods I" (5-15 CP), usually 10 CP
- "Master's Thesis" (31 CP)

2. Elective modules:
- "Methods II" (10 CP)
- "Knowledge Management and Communication" (15 CP)
- "Computer Science" (31 CP)
- "Tutor" (8 CP)
- "Internship" (6 CP)

The compulsory area must be studied completely (usually 79 CP). For the elective area (in total 70 CP), different modules or single lectures can be studied, taking the corresponding admission requirements into account (at least 36 CP).

A professional internship (with max. 6 CP) as well as a semester abroad can complement the course of the program.

4. Module overview

Abb.	L	Lecture	P	Paper	PR	Prerequisite
	AS	Advanced Seminar	T	Tutorial	TH	Thesis

Compulsory Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 1: EduTech	1-3	EduTech	L	2	4	WS	Presentation, Product (g) + PR
		EduTech Design Challenge	AS	2	4	WS	
		Computer-Supported Collaborative Learning	L	2	4	WS	Exam, Product (g) + PR
		Tech Trends & Gadgets	AS	2	2	SS	Presentation, Product (g) + PR
		Total 14 CP					

Compulsory Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 2: Learning with Media	2-3	Multi-Media Learning I	AS	2	4	SS	Exam, Product (g) + PR
		Multi-Media Learning II	AS	2	4	WS	Exam, Product (g) + PR
		Self-regulated learning with media	AS	2	4	SS	Exam (g) + PR
		Total 12 CP					

Compulsory Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 3: Design	1-3	Instructional Design I	AS	2	4	WS	Exam (g) + PR
		Instructional Design II	AS	2	4	SS	Exam, Product (g) + PR
		Design Thinking	AS	2	4	WS	Exam, Product (g) + PR
		Total 12 CP					

Compulsory Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 4: Methods I	1-2	Empirical Research Methods I: Foundations of hypothesis testing	AS	2+2	5	WS	Exam (g) + PR
		Empirical Research Methods II: Experimentation in practice	AS	2+2	5	SS	Product (g) + PR
		Programming for EduTech	AS	2+2	5	WS	Exam, Product (g) + PR
		Total 5-15 CP, usually not less than 10 CP					

Elective Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 5: Methods II	3-4	Empirical Research Methods III: Process analysis	AS	2	5	WS	Exam, Product (u) + PR
		Empirical Research Methods IV: Eye tracking	AS	2	5	SS	Exam, Product (u) + PR
		Total 10 CP					

Elective Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 6: Knowledge Management and Communication	1-4	Collaborative Business Process Management	AS	4	6	yearly	Presentation, Project (g)
		Learning Communities and Social Media	AS	2	3	WS	Presentation, Exam (g) + PR
		Educational Technology for the Classroom	AS	2	3	SS	Exams (g) + PR
		Intercultural Learning	AS	2	3	SS	Presentation, Seminar paper (g)
	Total 15 CP						

Elective Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 7: Computer Science	1-3	Artificial Intelligence	L+T	2+2	9	SS	Exam (u)
		Human-Computer Interaction	L+T	4+2	9	WS	Exam (u)
		Interactive Systems	L	2	6	SS	Exam (u)
		Intelligent Tutoring Systems	AS	2	7	yearly	Report (u)
	Total 31 CP						

Elective Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 8: Tutor	2-3	Tutor/E-Tutor Training	AS	2	2	SS	Report (u)
		Tutoring + Supervision	T	2	6	WS / SS	
	Total 8 CP						

Elective Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 9: Internship	1-4	Internship	-	-	max 6	WS/ SS	Report (u)
	Total 6 CP						

Compulsory Module	Reg. stud. period	Module Elements	Course type	SWS	CP	Term	Assessed Performances
Module 10: Master	4	Master's Thesis	TH	-	30	SS	Thesis (g)
		Master Seminar	AS	2	1	WS / SS	
	Total 31 CP						

5. Sample study plans

A.	**Students without previous knowledge in Research Methods and Programming**			
	Sample study plan I	**Lectures / seminars**	**SWS**	**CP**
WS1	**Compulsory module 1:** EduTech	L + AS	4	8
	Compulsory module 1: Computer-Supported Collaborative Learning	AS	2	4
	Compulsory module 3: Instructional Design I	L	2	4
	Compulsory module 4: Empirical Research Methods I	AS+T	4	5
	Compulsory module 4: Programming for EduTech	AS+T	4	5
	Elective module 6: Learning Communities and Social Media	AS	2	3
In total				**29**
SS2	**Compulsory module 1** Tech Trends & Gadgets	AS	2	2
	Compulsory module 2: Multi-Media Learning 1	AS	2	4
	Compulsory module 2: Self-regulated learning with media	AS	2	4
	Compulsory module 3: Instructional Design II	AS	2	4
	Compulsory module 4: Empirical Research Methods II	AS	2	5
	Elective module 6: Intercultural Learning	AS	2	3
	Elective module 7: Artificial Intelligence	L+ T	2+2	9
In total				**31**
WS3	**Compulsory module 2:** Multi-Media Learning 2	AS	2	4
	Compulsory module 3: Design Thinking	L	2	4
	Elective module 5: Empirical Research Methods III	AS	2	5
	Elective module 7: Intelligent Tutoring Systems	AS	2	7
	Elective module 7: Human-Computer Interaction	L+T	4+2	9
In total				**29**
SS4	**Compulsory module 12 (Master'sThesis)**	TH, AS	2	31
In total				**31**
TOTAL				**120**

B. Students with previous knowledge in Research Methods and without previous knowledge in Programming				
	Sample study plan I	**Lectures / seminars**	**SWS**	**CP**
WS1	**Compulsory module 1:** EduTech	L + AS	4	8
	Compulsory module 1: Computer-Supported Collaborative Learning	L	2	4
	Compulsory module 3: Instructional Design I	L	2	4
	Compulsory module 4: Programming for EduTech	AS+T	4	5
	Elective module 7: Human-Computer Interaction	L+T	4+2	9
In total				**30**
SS2	**Compulsory module 1** Tech Trends & Gadgets	AS	2	2
	Compulsory module 2: Multi-Media Learning 1	AS	4	4
	Compulsory module 2: Self-regulated learning with media	AS	2	4
	Compulsory module 3: Instructional Design II	AS	2	4
	Compulsory module 4: Empirical Research Methods II	AS	2	5
	Elective module 6: Educational Technology for the Classroom	AS	2	3
	Elective module 8: Tutor Training + Tutoring	AS+T	2	8
In total				**30**
WS3	**Compulsory module 2:** Multi-Media Learning 2	AS	4	4
	Compulsory module 3: Design Thinking	L	2	4
	Elective module 4: Empirical Research Methods III	AS	2	5
	Elective module 6: Learning Communities and Social Media	AS	2	3
	Elective module 7: Intelligent Tutoring Systems	AS	2	7
	Elective module 9: Internship			6
In total				**29**
SS4	**Compulsory module 12 (Master'sThesis)**	TH, AS	2	31
In total				**31**
TOTAL				**120**

C. Students without previous knowledge in Research Methods and with previous knowledge in Programming				
	Sample study plan I	**Lectures / seminars**	**SWS**	**CP**
WS1	**Compulsory module 1:** EduTech	L + AS	4	8
	Compulsory module 3: Instructional Design I	L	2	4
	Compulsory module 4: Empirical Research Methods I	AS+T	4	5
	Elective module 7: Intelligent Tutoring Systems	AS	2	7
	Elective module 9: Internship			6
In total				**30**
SS2	**Compulsory module 1:** Tech Trends & Gadgets	AS	2	2
	Compulsory module 2: Multi-Media Learning 1	AS	4	4
	Compulsory module 2: Self-regulated learning with media	AS	2	4
	Compulsory module 3: Instructional Design II	AS	2	4
	Compulsory module 4: Empirical Research Methods II	AS	2	5
	Elective module 5: Collaborative Business Process Management	AS	2	6
	Elective module 6: Educational Technology for the Classroom	AS	2	3
In total				**28**
WS3	**Compulsory module 1:** Computer-Supported Collaborative Learning	L	2	4
	Compulsory module 2: Multi-Media Learning 2	AS	4	4
	Compulsory module 3: Design Thinking	L	2	4
	Elective module 4: Empirical Research Methods III	AS	2	5
	Elective module 4: Empirical Research Methods IV	AS	2	5
	Elective module 7: Human-Computer Interaction	L+T	4+2	9
In total				**31**
SS4	**Compulsory module 12 (Master'sThesis)**	TH, AS	2	31
In total				**31**
TOTAL				**120**

6. Modules

Module 1: EduTech					Abb. **ET**
Study semester **1**	Recm semester **1**	Term **yearly**	Duration **2-3 Sem**	SWS **6**	ECTS-Points **14**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Prof. Dr. Armin Weinberger, Learning Sciences, Faculty HW
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Compulsory module
Admission requirements	None
Performance checks / examinations	Graded module examinations + Prerequisites for examination (PR)
Lectures and seminars / SWS [If applicable participant limit]	1. Lecture *EduTech* / 2 SWS (weekly hours) 2. Seminar *EduTech Design Challenge* / 2 SWS 3. Lecture *Computer-Supported Collaborative Learning* / 2 SWS 4. Seminar *Tech Trends & Gadgets* / 2 SWS [Participant limit: 25]
Workload	[max. total] 1. 120 hours 2. 120 hours 3. 120 hours 4. 60 hours [Attendance time] 1. 30 hours 2. 30 hours 3. 30 hours 4. 30 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. 90 hours 2. 90 hours 3. 90 hours 4. 30 hours
Module grade	The module grade is calculated on the basis of the examination grades of the (graded) completed module elements, averaged with the corresponding CPs, whereby EduTech L / AS depicts a module element.

Learning goals / competencies

1. The *EduTech* lecture provides an historical overview of educational technology, epistemological considerations of educational technology as a scientific discipline, and a basis for understanding how new technology can help realize a new pedagogy based on theories of learning and instruction. Students will be introduced to both cognitive and affective foundations of this pedagogy and examples of how new technologies have succeeded and failed at moving towards that goal. We will place additional attention on how practical and theoretical considerations interact when designing for these contexts.

2. In the *EduTech Design Challenge*, the learners acquire competencies on how to critically read scientific articles of educational technology, design and develop a technology-enhanced learning environment based on theories of learning and instruction, and present their design in different formats (live presentation, video, and report).

3. After completion of the *Computer-Supported Collaborative Learning* course, the student is able to
   - Apply theoretical ideas of Collaborative Learning in the context of Computer-Supported Collaborative Learning (CSCL)
   - Define the concept of CSCL
   - Recognize the role of orchestration and scripting in CSCL
   - Use emerging technologies as CSCL tools

4. In the *Tech Trends & Gadgets* seminar, the students
   - obtain an overview of educational technologies as tools for teaching and learning
   - acquire a critical understanding for the application of educational technologies in the classroom
   - know the possibilities that educational technologies offer to enhance self-regulated and collaborative learning (especially in relation to the potentials of scripts for the orchestration of learning scenarios, of feedback and awareness tools, and of multimedia learning) and for task design within a classroom environment.

Content of the Module

1. The *EduTech* lecture will cover the following topics:
   - An introduction to educational technology
   - Behaviorism, Cognitivism, Constructivism
   - Learner-centered theories of instruction, such as inquiry-based learning and design-based learning
   - The potential of and challenges to new technology enabling this pedagogy on a large scale Issues of cognition and motivation in educational technology

2. The *EduTech Design Challenge* seminar covers several reading assignments on topics discussed in the EduTech lecture and basics of design languages.

3. The *Computer-Supported Collaborative Learning* lecture will cover the following topics:
   - The concept of CSCL
   - Theoretical models of CSCL
   - Design and set-up of CSCL environments
   - Scripts for CSCL
   - Metacognition and co-regulation in CSCL

4. The virtual seminar *Tech Trends & Gadgets* will cover:
   - Discussion tasks for critical understanding of the application of technologies in the classroom, including legal and practical barriers for the use of media
   - Multimedia presentation techniques on interactive whiteboards.
   - Design of technology-supported classroom scripts
   - Testing and orchestration of different social learning arrangements with the help of different social media and mobile devices
   - Exchange of experiences with teaching staff and educational technologists
   - Conception of a technology-based teaching unit in different subjects

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Language of examination] English

[Literature reference]
See permanently updated scripts

[Methods]
In the lecture: media-supported presentation

[Enrolment]
The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 2: Learning with Media					Abb. **LM**
Study semester **1**	Recm semester **2**	Term **SS**	Duration **2 Sem**	SWS **6**	ECTS-Points **12**

Module responsible	Prof. Dr. Roland Brünken
Lecturer(s)	Prof. Dr. Roland Brünken, Prof. Dr. Franziska Perels, Dr. Sarah Malone, Learning Sciences, Faculty HW
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Compulsory module in the master program
Admission requirements	None
Performance checks / examinations	Graded module examinations + Prerequisites for examination (PR)
Lectures / seminars / SWS [If applicable participant limit]	1. Seminar *Multi-Media Learning I* / 2 SWS 2. Seminar *Multi-Media Learning II* / 2 SWS 3. Seminar *Self-regulated learning with media* / 2 SWS [Participant limit 25]
Workload	[max. total] 1. 120 hours 2. 120 hours 3. 120 hours [Attendance time] 1. 30 hours 2. 30 hours 3. 30 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. 90 hours 2. 90 hours 3. 90 hours
Modulnote	The module grade is calculated on the basis of the examination grades of the (graded) completed module elements, averaged with the corresponding CPs.

Learning goals / competencies

    1.   Topic: *Theoretical basics of learning with multimedia instruction*
Learning goals
In the seminar *Multimedia Learning I - Theoretical basics of learning with multimedia instruction* the following learning goals are pursued:

Students will be able to
- explain the basic theoretical assumptions regarding human information processing, cognitive load and multimedia learning.
- explain basic design principles of multimedia learning.
- relate cognitive theories to multimedia design and learning processes and outcomes.

In the seminar students will gain first-hand experience using a number of collaborative technologies and will learn about other influential and effective systems to support both distance collaboration and co-located collaboration.

2. Topic: *Multiple representations, emotion, and embodiment in multimedia instruction*

Learning goals

In the seminar *Multimedia Learning II - Multiple representations, emotion, and embodiment in multimedia instruction* the following learning goals are pursued:

Students will be able to
- explain the basic theoretical assumptions regarding the role of representations in learning.
- explain the basic theoretical assumptions regarding the role of emotions and embodiment in learning.
- explain related design principles of multimedia learning.

3. Advanced seminar *Self-regulated learning with media*

The course with theoretical and practical parts is designed to
- introduce students into the theory of self-regulated learning (SRL)
- give the students an overview of the main studies and empirical findings of SRL research
- present and discuss core intervention studies to foster SRL
- instruct and coach students to develop a training to support SRL in media contexts

Content of the module

1. The following contents are included:

Theories
- Cognitive Theory of Multimedia Learning
- Cognitive Load Theory

Design principles
- Multimedia Principle, Modality Principle, Redundancy Effect
- Segmentation Principle, Pre-training Principle
- Coherency Principle and Seductive Details
- Signaling (Cuing) Principle

- This seminar covers the same content as the lecture course it accompanies; however, the content will be handled through more hands-on activities, such as discussion, student-led lecture, and demonstrations of CSCL technologies.

2. This seminar focuses on the theoretical basics of multimedia learning with different kinds of representations, the role of emotions in multimedia instruction, the role of embodiment in multimedia instruction, and the deduction of related principles for designing multimedia instruction.

The following contents are included:

Theories
- The DeFT (design, functions, tasks) framework
- The Cognitive Affective Theory of Multimedia Learning

Design principles
- Personalization Principle, Voice Principle, Image Principle
- Principles of Collaborative Cognitive Load Theory
- Embodiment Principle, Tracing Principle

3. The advanced seminar Self-regulated learning with media will cover the following topics:

Theories:
- Self-regulated learning (SRL): Definition, models, trainings to support SRL, empirical findings and main results
- SRL with media: SRL during learning with media, fostering SRL through media

Practice: Development of trainings to support SRL (conception and material) in media contexts

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English
[Language of examination] English

[Literature reference] see permanently updated scripts
Mayer, R. E. (2001). Multimedia Learning. First chapter: The promise of multimedia learning (pp. 1-20). Cambridge: University Press.

Scaife, M., & Rogers, Y. (1996). External cognition: how do graphical representations work? International Journal of Human-Computer Studies, 45, 185-213.

Sweller, J., van Merriënboer, J.J.G., & Paas, F.G.W.C. (1998). Cognitive architecture and instructional design. Educational Psychology Review, 10(3), 251-296.

de Jong, T. (2010). Cognitive load theory, educational research, and instructional design: some food for thought. Instructional Science.

Klug, J., Ogrin, S., Keller, S., Ihringer, A., & Schmitz, B. (2011). A plea for self-regulated learning as a process: Modelling, measuring and intervening. *Psychological Test and Assessment Modeling*, *53*(1), 51–72.

Mayer, R.E. (2001). Multimedia Learning. Chapter 11: Principles of multimedia design (pp. 183-194). New York: Cambridge University Press.

Mayer, R.E. & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. Educational Psychologist, 38(1), 43-52.

Schnotz, W., & Bannert, M. (2003). Construction and interference in learning from multiple representation. Learning and Instruction, 13(2), 141-156.

Veenman, S., & Beems, D. (1999). Implementation effects of a training program for self-regulated learning. *Journal of Research and Development in Education, 32,*

Weinberger, A., & Mandl, H. (2003). Computer-mediated knowledge communication. Studies in Communication Sciences, 81-105.

Zimmerman, B. J. (2000). Attaining Self-Regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of Self-Regulation* (pp. 13–39). San Diego, CA: Academic Press.

[Methods]
Different learner- and group-centered types of work, accompanied (where usual) by hands-on praxis.

[Enrolment]
The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 3: Design					Abb. **D**
Study semester **1**	Recm semester **1-3**	Term **WS/SS**	Duration **3 Sem**	SWS **6**	ECTS-Points **12**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Lecturers of the Learning Sciences, Faculty HW
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Compulsory module in the master program
Admission requirements	None
Performance checks / examinations	Graded module examinations + Prerequisites for examination (PR)
Lectures / seminars / SWS [If applicable participant limit]	1. Advanced Seminar *Instructional Design I* / 2 SWS [Participant limit 25] 2. Advanced Seminar *Instructional Design II* / 2 SWS [Participant limit 25] 3. Advanced Seminar *Design Thinking* / 2 SWS [Participant limit 25]
Workload	[max. total] 1. 120 hours 2. 120 hours 3. 120 hours [max. Attendance time] 1. 30 hours 2. 30 hours 3. 30 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. 90 hours 2. 90 hours 3. 90 hours
Module grade	The module grade is calculated on the basis of the examination grades of the (graded) completed module elements, averaged with the corresponding CPs.

Learning goals / competencies

1. In *Instructional Design I* learners will acquire:
- Knowledge about the development of instructional design theories
- Overview of behaviorist, cognitivist and constructivist instructional design approaches
- Knowledge about the most prominent instructional design theories
- Knowledge and practice about the development of instructional designs

2. In *Instructional Design II* learners will acquire:
- Practice about the development of an instructional design project
- Practice about the application of the Do-ID model

- Knowledge about methods for usability testing
- Knowledge about methods for analysis and evaluation

3. The goals of the *Design Thinking* seminar are:
- Students understand various facets of design and design thinking.
- Students learn to apply design thinking for innovation and design tasks.
- Students understand and practice graphical and interface design.

Content of the module
1. *Instructional Design I* will cover the following topics:
- Behaviorist, cognitivist and constructivist theories
- Anchored Instruction
- Cognitive Apprenticeship
- Goal Based Scenarios
- 4C-ID
- Pebble in the Pond
- Instructional Design Theories for different outcomes
- Decision Oriented Instructional Design Mode

2. *Instructional Design II* will cover the following topics:
- Work on a concrete instructional design project
- Using the Decision Oriented Instructional Design Model
- Creative working techniques
- Methods for usability testing
- Methods for analysis
- Methods for evaluation

3. *Design Thinking* will cover the following topics:
- Approaches to design thinking for innovation and design practices
- Multimedia communication and basics of typography and illustration

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]
see permanently updated scripts
Brünken, R., Münzer, S., & Spinath, B. (in press). Lehrbuch Pädagogische Psychologie, Bd. 1 (lehren und Lernen), Kapitel 10 Instruktionspsychologie, Göttingen, Hogrefe
Ko, S., & Rossen, S. (2017). *Teaching Online. A Practical Guide* (4th ed.). New York: Routledge.
Niegemann, H., Domagk, S., Hessel, S., Hein, A., Hupfer, M. & Zobel, A. (2008). *Kompendium Multimediales Lernen.* Berlin: Springer.
Reigeluth, C. M. (1983). (Ed.). *Instructional Design Theories and Models. Volume I: An Overview of their Current Status.* Hillsdale, NJ, Erlbaum.
Reigeluth, C. M. (1999) (Ed.). *Instructional-Design Theories and Models. Volume II: A New Paradigm of Instructional Theory.* Mahwah, NJ: Erlbaum.
Reigelluth, C. M. & Carr-Chellman, A. A. (2009a) (Eds.). *Instructional-Design Theories and Models. Volume III: Building a Common Knowledge Base.* New York: Routhledge.
Reiser, R. A., & Dempsey, J. V. (Eds.). (2018). *Trends and issues in instructional design and technology, 3rd edition* (4rd ed.). New York: Pearson.

[Methods]
In the seminars: different learner- and group-centered types of work, accompanied (where usual) by hands-on praxis.

[Enrolment]
The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 4: Methods I					Abb. **M1**
Study semester **1**	Recm semester **1-2**	Term **WS/SS**	Duration **2 Sem.**	SWS **12**	ECTS-Points **15**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Lecturers of Educational Technology, Learning Sciences, Faculty HW
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Compulsory module in the master program
Admission requirements	None
Performance checks / examinations	Graded module examinations + Prerequisites for examination (PR)
Lectures / seminars / SWS [If applicable participant limit]	1. Seminar and tutorial *Empirical Research Methods I: Foundations of hypothesis testing* / 2+2 SWS 2. Seminar and tutorial *Empirical Research Methods II: Experimentation in practice* / 2+2 SWS 3. Seminar and tutorial *Programming for EduTech* / 2+2 SWS
Workload	[max. total] 1. 150 hours 2. 150 hours 3. 150 hours [max. Attendance time] 1. 60 hours 2. 60 hours 3. 60 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. 90 hours 2. 90 hours 3. 90 hours
Module grade	The module grade is calculated on the basis of the examination grades of the (graded) completed module elements, averaged with the corresponding CPs.

Learning goals / competencies
1. The learning goals of *Empirical Research Methods I: Foundations of hypothesis* are:
- understand the underlying principles of empirical research
- get to know the central concepts of empirical research methods and the main statistical tests learn to read, understand and critically evaluate empirical research papers
- develop knowledge and competencies to develop hypotheses, experimental designs, procedures, and instruments, to select and conduct statistical tests using statistical analysis software

2. In the seminar *Empirical Research Methods II: Experimentation in practice* students:
- gain realistic experience about planning and conducting studies in educational technology
- practice collecting, organizing, analyzing, and presenting data on processes and outcomes of learning with statistical software

3. The seminar *Programming for EduTech* is designed to introduce novices to the foundations of programming. Students will gain hands-on experience in programming a computer to solve increasingly difficult problems. Thus, they will develop algorithmic thinking that will prepare them to do light programming (i.e., scripting) and better communicate with programmers. The seminar requires significant in-class time and will be tailored to the abilities of the students

Content of the module

1. This seminar *Empirical Research Methods I: Foundations of hypothesis testing* will cover the following topics:
- Generating hypotheses
- Developing instruments
- Experimental designs
- Quality criteria in research
- Data collection and organization
- Descriptive statistics
- Inferential statistics
- Data analysis with statistical software

2. The seminar Programming for Beginners will cover the following topics:
- Coding / Syntax / Message passing
- Control flow, including loops and conditionals
- Simple data structures (e.g., collections, objects)
- Simple algorithms (e.g., sums, counts)
- Abstraction through functions and parameters
- Programming tools

3. The seminar *Empirical Research Methods II: Experimentation in practice* will cover the following topics*:*
- Designing experiments for learning with educational technology
- Developing instruments for assessing learning with educational technologies
- Conducting qualitative and quantitative analyses of learning processes and outcomes
- Presenting research results in various formats, e.g. as a poster
- Getting to know advanced or EduTech specific research methods, for example qualitative analysis of learning processes

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]
see permanently updated scripts

[Methods]
In the seminars: different learner- and group-centered types of work, accompanied (where usual) by hands-on praxis.

[Enrolment]
The enrolment for the different lectures / seminars will be disclosed in the webpages of the departments. The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 5: Methods II					Abb. **M2**
Study semester **3**	Recm semester **3**	Term **WS**	Duration **2 Sem.**	SWS **4**	ECTS-Points **10**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Lecturers of the Learning Sciences, Faculty HW
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Elective module in the master program
Admission requirements	None
Performance checks / examinations	1. Ungraded written exam or product 2. Ungraded written exam or product
Lectures / seminars / SWS [If applicable participant limit]	1. Seminar and tutorial *Empirical Research Methods III: Process analysis* / 2 SWS 2. Seminar and tutorial *Empirical Research Methods IV: Eye tracking* / 2 SWS
Workload	[max. total] 1. 150 hours 2. 150 hours [max. Attendance time] 1. 30 hours 2. 30 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. 90 hours 2. 90 hours
Module grade	The module is ungraded

Learning goals / competencies

1. In the seminar *Empirical Research Methods III: Process analysis*, the following learning goals are pursued:
   - Students understand the rationale of and review typical studies involving process analyses.
   - Students learn how to conduct and interpret multimodal process analyses with a focus on content / discourse analysis.
   - Students familiarize themselves with relevant concepts of learning processes

2. In the seminar *Edu Tech Research Methods IV: Eye tracking,* the following learning goals are pursued:
Students will be able to
   - Identify educational research aims, which can be investigated by the means of eye tracking.
   - Design an eye tracking experiment to address an actual research question.
   - Prepare learning materials to be used in an eye tracking study.
   - Choose appropriate eye tracking metrics, interpret and relate them to further performance measures.

Content of the module

1. The seminar *Empirical Research Methods III; Process analysis* focuses on:
-   Theoretical background of argumentative knowledge construction
-   Analysis of argumentative knowledge construction
    -   o Unit of analysis
    -   o Sampling
    -   o Segmentation
    -   o Coding
    -   o Reliability
    -   o Validity
    -   o Think-aloud protocols
    -   o Automatic discourse analysis
    -   o Multimodal analysis
    -   o Motivation and emotion
-   Exemplary studies building on process analyses
-   Related concepts and foci
    -   o Knowledge convergence
    -   o Transactivity
    -   o Embodied cognition

2. The seminar *Empirical Research Methods IV: Eye tracking* focuses on the use of eye tracking to address research aims related to education and learning. The seminar entails a theoretical part in which the students are provided a technical introduction to eye tracking. Additionally, the students will be given an understanding of the use of eye tracking in educational research. In the subsequent practical part, the students will use the theoretical information to plan an eye tracking experiment in small groups.

    The following contents are included:

Theoretical part
-   Technical functionality of eye trackers, different types of eye trackers, and their specifications
-   Eye tracking metrics related to fixations and saccades, different algorithms for event detection
-   Eye tracking metrics (e.g., pupil metrics) related to cognitive load measurement
-   Examples for eye tracking research in the domain of education

Practical part
-   Develop a distinct research question to be answered via eye tracking
-   Design an own eye tracking experiment
-   Prepare learning materials for the experiment
-   Describe the way to proceed basing on theoretical background (product)

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]
see permanently updated scripts

[Methods]
In the lectures: media-supported presentation, accompanied of exercises and other interactive elements

[Enrolment]
The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 6: Knowledge Management and Communication					Abb. **KMC**

Study semester **1-3**	Recm semester **3**	Term **SS**	Duration **3 Sem**	SWS **6**	ECTS-Points **9**

Module responsible   Prof. Dr. Armin Weinberger

Lecturer(s)   Prof. Dr. Armin Weinberger, Lecturers of Educational Technology and Economics, Faculty HW

Allocation in the curriculum
[Compulsory, optional compulsory, elective]
     Elective module in the master program

Admission requirements   None

Performance checks / examinations
1. Graded project task and presentation
2. Graded oral and/or written examination

Lectures / seminars / SWS
[If applicable participant limit]
1. Advanced Seminar *Collaborative Business Process Management* / 4 SWS
   [Participant limit 30]
2. Advanced Seminar *Learning Communities and Social Media* / 2 SWS
3. Advanced Seminar *Educational Technology for the Classroom* / 2 SWS
4. Advanced Seminar *Intercultrual Learning* / 2 SWS [Participant limit 25]

Workload

[max. total]
1. 180 hours
2. 90 hours
3. 90 hours
4. 90 hours

[max. Attendance time]
1. 60 hours
2. 30 hours
3. 30 hours
4. 30 hours

[Preparation and follow-up, self study, if applicable practice exercises]
1. 120 hours
2. 60 hours
3. 60 hours
4. 60 hours

Module grade   The module grade is calculated on the basis of the examination grades of the (graded) completed module elements, averaged with the corresponding CPs.

Learning goals / competencies

1. The goal of the *Collaborative Business Process Management* course is to gain expertise in the area of business process management, by means of practical examples. Within the course, a concept for outsourcing of different business areas from an American to a German company is developed in four different scenarios. This concept comprehends organizational rules, a description of the collaborative business processes and a data-processing concept for its implementation. Each scenario involves a German and an American company, which are represented by a group of students of the UdS and of the Widener University in Philadelphia respectively.

2. After completing the *Learning Communities and Social Media* seminar
- Students understand the concept of social media as well as the design and functionalities of different social media applications and services.
- Students understand basic principles, tools, and theoretical approaches of computer-mediated communication

3. In the *Educational Technology for the Classroom* seminar, the students:
- Obtain an overview of tools for teaching and learning
- Acquire a critical understanding for the application of learning hard- and software in the classroom
- Know the possibilities that digital technology offer to enhance self-regulated and collaborative learning (especially in relation to the potentials of scripts for the orchestration of learning scenarios, of feedback and awareness tools, and of multimedia learning) and for task design within a classroom environment.

4. The seminar *Intercultural Learning* will engage students in:
   - Understanding different cultures
   - Knowledge and competencies to understand and act in intercultural settings
   - Knowledge of theoretical approaches and models of intercultural learning
   - Knowledge of cross-cultural studies on intercultural learning
   - Methods of cross-cultural research
   - Designing environments for intercultural learning and competence

Content of the module

1. The *Collaborative Business Process Management* course covers the following topics:
   - Collaborative process management
   - Project work in teams
   - Joined work with US-teams
   - Linguistic and intercultural experiences

2. The Learning Communities and Social Media seminar covers the following topics:
- Historical overview of the internet and Web 2.0
- Approaches and central findings of research on computer-mediated communication
- Community-based approaches to learning and problem solving
- Design and reception of social media messages and memes
- Scenarios of learning with social media
- Approaches of learning communities and communities of practice

3. The virtual seminar *Educational Technology for the Classroom* covers the following topics:
- Discussion tasks for critical understanding of the application of technology in the classroom, including legal and practical barriers for the use of media
- Multimedia presentation techniques on interactive whiteboards.
- Design of technology-supported classroom scripts
- Testing and orchestration of different social learning arrangements with the help of different social media and mobile devices
- Exchange of experiences with teaching staff and educational technologists
- Conception of a technology-based teaching unit in different subjects

4. The seminar *Intercultural Learning* covers the following topics:
   - Methods and theories of intercultural learning
   - Culture shock and intercultural conflicts
   - Research on heterogeneity in the classroom and multilingualism in schools
   - Technology-enhanced environments for intercultural learning

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]
see permanently updated scripts

[Methods]
in the seminars: Different learner- and group-centered types of work, accompanied (where usual) by hands-on praxis.

in the Lecture: slides and projector, whiteboard or smartboard, partially also computer tutorials about technological topics (wikis, blogs, etc.), teamwork framed by a small project, brainstorming sessions, workshops
For the Seminar *Intercultural Learning:* seminar structured by presentations and groupwork of the participants

[Enrolment]
The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 7: Computer Science					Abb. **CS**
Study semester **1-3**	Recm semester **2**	Term **WS/SS**	Duration **3 Sem**	SWS **14**	ECTS-Points **31**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Lecturers of the Faculty for Mathematics and Computer Science (MI)
Admission requirements	None.
Performance checks / examinations	1. Ungraded written exam 2. Ungraded presentation 3. Ungraded written exam and attestation
Lectures / seminars / SWS [If applicable participant limit]	1. Lecture with Tutorial *Artificial Intelligence* / 2+2 SWS 2. Lecture with Tutorial *Human Computer Interaction* / 4+2 SWS 3. Lecture *Interactive Systems* / 2 SWS 4. Seminar *Intelligent Tutoring Systems* / 2 SWS
Workload	[max. total] 1. 270 hours for the Lecture und the Tutorial Artificial *Intelligence* 2. 270 hours for the Lecture und Tutorial Human Computer *Interaction* 3. 180 hours for the Lecture Interactive Systems 4. 210 hours for the Seminar Intelligent Tutoring Systems [Attendance time] 5. 60 hours for the Lecture und the Tutorial Artificial *Intelligence* 6. 90 hours for the Lecture und Tutorial User Interface Design 7. 30 hours for the Lecture Interactive Systems 8. 30 hours for the Seminar Intelligent Tutoring Systems [Preparation and follow-up, self study, if applicable practice exercises] 9. 210 hours for the Lecture und the Tutorial *Artificial Intelligence* 10. 180 hours 11. 150 hours for the Lecture Interactive Systems 12. 180 hours for the Seminar Intelligent Tutoring Systems
Module grade	The module is ungraded.

Learning goals / competencies

1. The lecture *Artificial Intelligence* aims at getting students acquainted with the basic issues and current trends in AI. Students will learn to critically think about and handle those issues. They will see ways to apply techniques of artificial intelligence in different areas where artificial intelligence plays a prominent role.

   The practical exercises will allow students to look closer into the issues handled in the lecture and gain their own understanding of them. They will also give students the opportunity to practice the theoretical knowledge gained in the lecture through related exercises.

2. This lecture *Human Computer Interaction* teaches the theoretical and practical foundations for human computer interaction. It covers a wide overview of topics, techniques and approaches used for the design and evaluation of modern user interfaces. The course covers the principles that underlie successful user interfaces, provides an overview of input and output devices and user interface types, and familiarizes students with the methods for designing and evaluating user interfaces. Students learn to critically assess user interfaces, to design user interfaces themselves, and to evaluate them in empirical studies.

3. This course *Interactive Systems* introduces technical concepts, software paradigms and hardware technologies of modern interactive systems. Their application is illustrated using seminal and recent examples from graphical user interfaces, mobile interfaces, ubiquitous computing (internet of things), augmented reality, and physical interfaces

4. In this seminar, intelligent tutoring systems will be examined with some emphasis on natural language interaction, including: Analysis Generation Dialog Specific aspects such as tutorial strategies and system architecture

Content of the module

1. In the lecture *Artificial Intelligence* the following topics will be covered*:*
   - Structure and Overview of AI: intelligent agents, representation, search, learning
   - Methods of AI: problem solving, logic and logical inference, knowledge representation and reasoning, planning, uncertainty and reasoning, learning
   - The Main Subareas of AI: Natural Language Processing Overview, Computer Vision Overview, Robotics Overview, Automated Reasoning Systems Overview, Expert Systems Overview, Multiagent Systems Overview

   In the practical exercise *Artificial Intelligence* the topics covered in the lectured will be further pursued and practical exercises will uncover the problematic of those topics better.

2. In the lecture *Human Computer Interaction* the following topics will be covered:
   - Fundamentals of human-computer interaction
   - User interface paradigms, input and output devices
   - Desktop & graphical user interfaces
   - Mobile user interfaces
   - Natural user interfaces
   - User-centered interaction design
   - Design principles and guidelines
   - Prototyping

3. In the course *Interactive Systems* the following topics will be covered:
   - Technologies (Window systems, Device technology, basic electronics, microcontrollers, Sensors, displays, and actuators, Touch input, Capturing physical context, Physical prototyping and digital fabrication)
   - Applications (Graphical user interfaces, Mobile interfaces, Ubiquitous computing (Internet of Things), Tangible interfaces, Augmented and virtual reality, Wearable and embodied interfaces)

4. In the course *Intelligent Tutoring Systems* the following topics will be covered:
   - natural language interaction
   - Analysis Generation Dialog Specific aspects such as tutorial strategies and system architecture

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Language of examination] English

[Literature reference] see permanently updated scripts

[Methods] Different learner- and group-centered types of work, accompanied (where usual) by hands-on praxis.

[Enrolment]
The enrolment for the different lectures / seminars will be disclosed in the webpages of the departments. The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 8: Tutor					Abb. **TUT**
Study semester **2**	Recm semester **2-3**	Term **SS**	Duration **1-2 Sem.**	SWS **2**	ECTS-Points **8**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Prof. Dr. Armin Weinberger
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Elective module in the master program
Admission requirements	There is a max. of 8 places. The selection is arranged and announced by the module responsible.
Performance checks / examinations	Ungraded report.
Lectures / seminars / SWS [If applicable participant limit]	1. Advanced Seminar *Tutor / E-Tutor Training* 2. Teaching *Tutoring and Supervision*
Workload	[max. total] 240 hours 1. 60 hours 2. 180 hours [max. Attendance time] 1. 30 hours 2. 30 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. 30 hours 2. 150 hours
Module grade	The module is ungraded.

Learning goals / competencies
1. In the *Tutor* seminar, the students will acquire:
- Didactical and methodical competencies for the supervision and mentoring of courses of the master program Educational Technology
- Consolidated knowledge of specific contents of the curriculum

2. The *tutoring with supervision*:
- Within the tutoring of a course of the master's program Educational technology, the tutors learn to deal with different student requirements and abilities.
- Tutors learn how to impart complex scientific contents in different learning contexts.

Content of the module

1. The *Tutor* seminar will cover:
   - Didactical aspects of teaching
   - Teaching methods and media
   - Lesson planning
   - Classroom management
   - Interaction and communication in class
   - Feedback

2. The *Tutoring with Supervision* implies:
   - Regular attendance at a course in the master program Educational Technology
   - Autonomous teaching as well as with co-tutors and lecturers
   - Creation and correction of tutorial questions and examples
   - Weekly consultation hours for students
   - Weekly guided tutor meetings
   - Supervision and correction of tests

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]
see permanently updated scripts

[Methods]
In the Seminar Different learner- and group-centered types of work, accompanied (where usual) by hands-on praxis.

[Enrolment]
The enrolment for the different lectures / seminars will be disclosed in the webpages of the departments. The students are responsible for the registration for the examination in HISPOS, in order to be able to obtain the CPs.

[Further information]

Module 9: Internship					Abb. **IN**
Study semester **1-4**	Recm semester **1-4**	Term **WS/SS**	Duration **1**	SWS	ECTS-Points **max. 6**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Prof. Dr. Armin Weinberger
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Elective module in the master program
Admission requirements	Each internship needs to be approved by the module responsible.
Performance checks / examinations	Ungraded report
Lectures / seminars / SWS [If applicable participant limit]	1. /
Workload	[max. total] 180 hours 1. 180 hours [max. Attendance time] 1. 180 hours [Preparation and follow-up, self study, if applicable practice exercises] 1. /
Module grade	The module is ungraded.

Learning goals / competencies
Learning goals and competencies to be acquired in the internship are to practically apply theories and approaches of Educational Technology to real world problems. Students should acquire an understanding of practical challenges and limitations related to Educational Technology, and identify solutions building on technology.

Content of the module
The content and activities of the internship should be related to the content of the master's program Educational Technology and each internship needs to be approved by the module responsible beforehand.

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]

[Methods]

[Enrolment]
Information for application by International office and Career Center. The internship has to be approved by the EduTech study adviser in advance

[Further information]

Module 10: Master's Thesis					Abb. **MT**
Study semester **4**	Recm semester **4**	Term **WS/SS**	Duration **1**	SWS **1**	ECTS-Points **31**

Module responsible	Prof. Dr. Armin Weinberger
Lecturer(s)	Prof. Dr. Armin Weinberger
Allocation in the curriculum [Compulsory, optional compulsory, elective]	Compulsory module in the master program
Admission requirements	Successful completion oft he compulsory modules "EduTech" and "Methods I" (usually, 10 CP)
Performance checks / examinations	- Master's thesis - Presentation of the master's thesis
Lectures / seminars / SWS [If applicable participant limit]	1. Master's thesis 2. Advanced *Master Seminar* / 1 SWS
Workload	[max. total] 930 hours 1. 900 hours 2. 30 hours [max. Attendance time] 2. 15 hours [Preparation and follow-up, self study, if applicable practice exercises] 2. 15 hours
Module grade	Grade of the master's thesis. The module is passed, if the master's thesis is graded with a min. grade of "sufficient" (4.0).

Learning goals / competencies

Students deepen their knowledge on how to author a scientific paper, scientific language, formalities and ethics of academic writing, structuring a paper, organizing and conducting a study within a limited period, scientific presentations, and peer review. They will present their own thesis project as well as giving feedback to other students' projects. Together with the individual supervision provided, the joint seminar supports students in carrying out their master's thesis and enables them to receive feedback on their work from their peer group.

Content of the module

Applying scientific methods to investigate research questions typical of educational technology, presentation of the respective master projects, and critical peer review.

Further information [language of instruction, literature reference, methods, enrolment]

[Language of instruction] English

[Literature reference]
see permanently updated scripts

[Methods]

[Enrolment]
The students are responsible for the registration of the master's thesis in at the examination office.

[Further information]