Handbook of Modules for the Degree Programme

Usability Engineering, M.Sc.

Faculty of Communication and Environment

Version 1.3

21.08.2019

Dokumentenhistorie

Hinweis zur Versionen.

- Jede Änderung führt zu einer neuen Version. Sobald Module ausgetauscht werden, Inhaltlich neu ausgerichtet werden oder sich der Name des Moduls ändert, wird die Version um 1 erhöht. Alle kleinen Änderungen führen um eine Erhöhung rechts vom Komma.
- Die Modulnummer ist mit dem Modulnamen verknüpft. Sollte ein Modul wegfallen, so kann die Modulnummer nicht erneut vergeben werden.

Version	Datum	Verantw.	Bemerkung
1.0			Version für die Akkreditierung
1.1	19.01.2015	AR	Überschrift geändert (Degree Programm)
1.2	29.05.2018	KN	Anpassung der Module im Rahmen der Reakkreditierung.
1.3	21.08.2019	KN	Aktualisierung Datum, nach erfolgreicher Akkreditierung

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Curriculum of the Master Degree Programme Usability Engineering, M.Sc.

Code No (Kennnummer)	Module	SW (SWS)	L (V)	SL (SL)	S (S)	Ex (Ü)	PT (Pra)	Pro (Pro)	V/N	TE (Prü)	CP (CP)	WS1	SS2	WS3
M-UE_01	User Experience Design	5	2	1		2			75	P	5	5		
M-UE_02	Psychology for UX Practitioners	5	3			2			75	P	5	5		
M-UE_03	User Research and Testing	5	2			1	2		75	P	5	5		
M-UE_04	Current Topics and Developments in HCI I	4		2		2			60	P	5	4		
M-UE_05	Strategic Usability Engineering	4	2		1	1			60	P	5	4		
M-UE_06	Applied Research Project A	4					4		60	P	5	4		
M-UE_07	UX Project Management	3	2			1			45	P	5		3	
M-UE_08	Digital Fabrication for Human-Interface Design	5	2		1		2		75	P	5		5	
M-UE_09	Innovation and Design Thinking	3	1				2		45	P	5		3	
M-UE_10	Current Topics and Developments in HCI II	4		2		2			60	P	5		4	
M-UE_11	Applied Interaction Design	4	2			2			60	P	5		4	
M-UE_12	Applied Research Project B	4					4		60	P	5		4	
M-UE_13	Master Thesis & Colloquium	30								P				30
		80									60	27	23	30

		50 SW	30
		60 CP	30

90 CP

Allocation	SW	total	80	27	23	30
	CP	total	90	30	30	30

List of abbreviations	
SW	Semester hours per week (Semesterwochenstuden)
L	Lecture (Vorlesungs)
SL	Seminaristic lecture (Seminaristische Lehrveranstaltung)
S	Seminar (Seminar)
Ex	Exercise (Übung)
PT	Practical training (Praktikum)
Pro	Project (Projekt)
TE	Type of examination (Prüfungsform)
CP	Credit Points
WS	Winter semester (Wintersemester)
SS	Summer semester (Sommersemester)
E	Examination (Prüfung)
C	Certificate (Testat)

M-UE_01 User Experience Design

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_01	150 h	5 CP	1st semester	Winter semester	1 semester

Courses	Teaching time	Self-study		Planned group size
Lecture: 30 h / 2 semester hours per week (SWS) Exercise: 20 h / 2 SWS Seminar lecture: 15 h / 1 SWS	75 h / 5 SWS	75 h		20 students

Learning outcomes / Competences and qualifications profile

Students are familiar with terms and concepts in the field of user experience design. They are able to understand the importance and relevance of human capabilities in the process of system design. General principles and practice of usability, user experience and human-centred design were taught as the basis for an explicit understanding of users, their tasks and their environment and the corresponding conceptualization of designs focused on users' needs and requirements. This enables students to develop and evaluate solutions with focus on human-centred quality. The exercises have trained students to perform a complete project life cycle, from context of use and requirements analysis to project definition, conceptualization, evaluation and phase-out.

Content

- Usability, user experience, human-centred quality and user centred-design principles
- Properties of human capabilities
- Analysis and definition of the context of use
- Derivation of user needs
- Specification of user requirements
- Specification of user interaction
- Conceptualization and prototyping (paper- and tool-based)
- Usability testing
- Orchestration and use of methods

Teaching methods

Tuition in lectures, seminars lectures and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment

Written/Oral examination

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Digital Media (as elective)

Weight towards final grade

5,42%

Person in charge of module

 Prof. Dr. Karsten Nebe

Additional information

Benyon, David. Designing Interactive Systems. 10th ed. Addison Wesley, 2010.

Beyer, Karen Holtzblatt Hugh. Contextual Design: Defining Customer-Centered Systems. Morgan Kaufmann, 1997.

Brown, Dan M. Communicating Design: Developing Web Site Documentation for Design and Planning. Pearson Education (US), 2010.

Buxton, Bill. Sketching User Experiences: Getting the Design Right and the Right Design. Morgan Kaufmann, 2007.

Cockburn, Alistair. Writing Effective Use Cases. Addison-Wesley Professional, 2000.

Cooper, Alan, Robert Reimann, and David Cronin. About Face 3: The Essentials of Interaction Design. 4th ed. Wiley, 2014.

Courage, Kathy Baxter Catherine. Understanding Your Users: A Practical Guide to User Requirements Methods, Tools, and Techniques. Morgan Kaufmann, 2005.

Dix, Alan, Janet E. Finlay, Gregory D. Abowd, and Russell Beale. Human-Computer Interaction. 3rd ed. Prentice Hall, 2003.

Garrett, Jesse James. The Elements of User Experience: User-Centered Design for the Web and Beyond. 2nd ed. New Riders Press, 2010.

ISO 9241-110:2006. Ergonomics of human-system interaction - Part 110: Dialogue principles. ISO, 2006.

ISO 9241-210:2010. Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems. ISO, 2010.

ISO/IEC TR 25060:2010: Systems and software engineering -- Systems and software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability: General framework for usability-related information. ISO, 2010.

Mayhew, Deborah J. The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design. Morgan Kaufmann, 1999.

Moggridge, Bill. Designing Interactions. Mit University Press Group Ltd. 2016.

Pruitt, Tamara Adlin John. The Persona Lifecycle: Keeping People in Mind Throughout Product Design. Morgan Kaufmann, 2006.

Rogers, Yvonne, Jenny Preece, and Helen Sharp. Interaction Design: Beyond Human - Computer Interaction. 3rd ed. Wiley, 2011.

Stanton, Neville A., Paul M. Salmon, and Guy H. Walker. Human Factors Methods: A Practical Guide for Engineering And Design. Ed. Neville A. Stanton, Paul M. Salmon, and Guy H. Walker. Ashgate Publishing, 2005.

M-UE_02 Psychology for UX Practitioners

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_02	150 h	5 CP	1st semester	Winter semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Lecture: 45 h / 3 semester hours per week (SWS) Exercise: 30 h / 2 SWS	75 h / 5 SWS	75 h	20 students

Learning outcomes / Competences and qualifications profile

Students know the main underlying principles of human cognitive abilities and skills, such as perception, learning, memory, information processing, decision making and motor action. They are able to apply this knowledge to the field of usability engineering and human-computer interaction (HCI) (e.g. in the usability lab) to understand the cognitive background of (inter-)action and decision making in everyday situations. Students will also learn how to design, apply and statistically analyse psychological survey and user evaluation methods in the field of UX and HCI, including analysis, statistics, and questionnaire design. This knowledge will enable students to pave the way for the design of new building blocks for more natural and intuitive human-machine communication/ interaction according to user's needs and abilities, e.g. in modern working environments.

Content

- Learn about the underlying principles of human cognitive abilities and skills (perception, learning, memory, information processing, decision making and motor action).
- Principles of Interaction design from the point of perceptual-, working- and cognitive psychology (affordances, distributed cognition, and activity theory).
- Practice in observation and survey methods: How to design, perform and analyse evaluation studies, e.g. how to select the adequate methods and study design.
- Basic knowledge on commonly applied statistical methods, such as t-test and ANOVA. Including on how to calculate statistics with commons statistic programs (such as SPSS or R) and how to interpret the results adequately.
- Principles from work and organisational psychology/ occupational psychology (e.g. the design of user centred assistive systems in working environments).

Teaching methods

Tuition in lectures and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment

Written/Oral examination

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Weight towards final grade

5,42%

Person in charge of module

Prof. Dr. Kai Essig

Additional information

A. Baddeley, M. W. Eysenck, M. Anderson. Memory. Taylor & Francis, 2009.

B. Goldstein, Sensation and Perception. Mindtap for Psychology, 2016.

D.G. Elmes, B.H. Kantovitz, and H.L. Roediger. Research Methods in Psychology. Brooks/Cole; Auflage: 6th ,1998.

H.M. Reid. Introduction to Statistics: Fundamental Concepts and Procedures of Data Analysis, 1st Edition SAGE Publications, Inc, 2013.

J.P.J. Pinel and S. Barnes.Biopsychology - Global Edition. Pearson Education Limited; Edition: 10 ed, 2017.

M. W. Eysenck, M. T. & Keane. Cognitive Psychology. A Student´s Handbook. 6th edition. Taylor & Francis, 2016.

N.R. Carlson. Physiology of behavior. Boston, Pearson, 2013.

O. Huber. Das psychologische Experiment - Eine Einführung. Huber, Bern, 2005.

P.G. Nestor, and R.K. Schutt. Research methods in Psychology.Los Angeles, Calif. [u.a.], SAGE, 2012.

R.J. Gerring and Zimbardo, P.G. . Psychology and Life. 18th Edition. Pearson, 2007.

U. Kuckartz, S. Rädiker, T. Ebert, and J. Schehl. Statistik: Eine verständliche Einführung Taschenbuch. VS Verlag für Sozialwissenschaften, 2013.

M-UE_03 User Research and Testing

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_03	150 h	5 CP	1st semester	Winter semester	1 semester

Courses	Teaching time	Self-study		Planned group size
Lecture: 30 h / 2 semester hours per week (SWS) Exercise: 15 h / 1 SWS Seminar: 30 h / 2 SWS	75 h / 5 SWS	75 h		20 students

Learning outcomes / Competences and qualifications profile

The students have gained extensive theoretical knowledge about several analysis and evaluation methods and are trained to apply them in practice. They know which method to choose, depending on where in the user centred design process they are being performed most sufficiently, which research goals are being addressed and which resources need to be available. The students will also learn about current trends and popular methods in User Research and Testing Methods.

Furthermore, students have learned and practised fundamental qualitative research methods, like interviewing techniques and qualitative content analysis. Within several case studies, students have learned to apply and document those methods in various professional contexts.

Content

- Qualitative and quantitative User Research and Testing Methods (e.g. formative vs. summative usability testing, expert reviews, focus groups, heuristic evaluation, questionnaires, interviews, etc.)
- Design, conduct, analyse and document user surveys
- Formulate and report results and criteria for optimization
- Current trends and popular methods in User Research and Testing Methods
- Advanced research methods (e.g. eye tracking, valence method, user experience testing, etc.)
- Practical exercises will be carried out in the fully equipped Usability Laboratory

Teaching methods

Tuition in lectures, seminars and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment
Written/Oral examination

Requirements for the award of credit points
Passed assessment

Use of module (in other study programs)

Weight towards final grade
5,42%

Person in charge of module
Prof. Dr. Karsten Nebe

Additional information
A. Duchowski. Eye Tracking Methodology - Theory and Practice. Second Edition, Springer, 2007.

A. Duchowski. Eye Tracking Methodology - Theory and Practice. Second Edition, Springer, 2007.

B. Hambling and P. Van Goathem. User Acceptance Testing: A step-by-step guide. Bcs Learning & Development Limited, 2013.

Brandt et al. Lowering the Burden for Diary Studies Under Mobile Conditions, 2007.

B. Shneiderman, C. Plaisant. Designing the User Interface, 2005. J. C. Dumas, J.C. Redish. A Practical Guide to Usability-Testing. Portland: Intellect Books, 1999.

J. Hansen. How to Jumpstart User Testing: 16 Tools to Craft Better Products. Independently published, 2017.

J. Lazar and J. H. Feng. Research Methods in Human-Computer Interaction. John Wiley & Sons Ltd; 1. Edition, 2009.

J. Nielsen, R.L. Mack. Usability Inspection Methods. John Wiley & Sons, New York, 1994.

J. Rubin, D. Chisnell, J. Spool. Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. New York: John Wiley and Sons, 2. Edition, 2008.

K. Holmqvist et al. Eye tracking - a comprehensive guide to methods and measures. Oxfort University Press, 2011.

M. Kuniavsky A. Moed, and E. Goodman. Observing The user experience - A practitioner's guide to user research. Morgan Kaufmann Publishers, 2nd Edition, 2012.

R. A. Krueger, M. A. Casey. Focus groups - A practical guide for applied research. Thousand Oaks: Sage Publications, 2000.

S. Wolpers. Lean User Testing: A Pragmatic Step-by-Step Guide to User Tests (Hands-on Agile). Berlin Product People GmbH, 2015.

Tomitsch et al. Using Diaries for Evaluating Interactive Products: The Relevance of Form and Context, 2006.

von Brad Nunnally, D. Farkas (Autor). UX Research: Practical Techniques for Designing Better Products. O'Reilly UK Ltd.; 1. Edition, 2016.

von James Pannafino, P. McNeill. UX Methods: A Quick Guide to User Experience Research Methods. CDUXP LLC, 2017.

von Kathy Baxter, C. Courage, and K. Caine. Understanding Your Users: A Practical Guide to User Research Methods (Interactive Technologies) .Elsevier Ltd, Oxford; 2. Edition, 2015.

M-UE_04 Current Topics and Developments in HCI I

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_04	150 h	5 CP	1st semester	Winter semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Seminar lectures: 30 h / 2 semester hours per week (SWS) Exercise: 30 h / 2 SWS	60 h / 4 SWS	90 h	20 students

Learning outcomes / Competences and qualifications profile

Students have learned to communicate technical information and experimental findings in an easily understandable language. They have internalized the fundamentals of effective scientific writing and presentation, as well as practised and learned proper ways of communication design. They have deepened their knowledge of how to write and revise (technical) reports and manuals and have practised their skills by completing different hands-on assignments. Students have learned to plan and edit documentation materials and to estimate the effort needed to include proper illustrations, photographs, charts and diagrams. In addition to the ability to communicate technical knowledge students know how to plan and conduct experimental designs (e.g. usability tests, eye-tracking studies etc) and how to analyse and document the findings in adequate ways (e.g. to write a scientific paper).

Content

- Principles and practice of the various modes and forms of scientific writing and communication (e.g. scientific papers, technical reports, and presentations, etc.).
- Current studies from the HCI literature.
- Project presentations from work-practice (external presenter).
- Planning, designing, and conducting experimental (comparative) user studies.
- Selecting adequate domain and task specific research methods.
- Analyzing and documenting user studies and findings properly (i.e. as a scientific presentation or paper).
- A simulated conference submission and review process will complement the course

Teaching methods

Tuition in seminars lectures and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment
Study, report and presentation

Requirements for the award of credit points
Passed assessment

Use of module (in other study programs)

Weight towards final grade
5,42%

Person in charge of module
Prof. Dr. Kai Essig

Additional information

Albers, Michael J., and Mary Beth Mazur. Content and Complexity: The Role of Content in Information Design. Ed. Michael J. Albers, and Mary Beth Mazur. Routledge, 2003.

Alley, Michael. The Craft of Scientific Writing. 3rd ed. Springer, 1998.

Anderson, Paul V. Technical Communication: A Reader-centered Approach. 4th ed. Heinle & Heinle Publishing, 1998.

Agarwal, B. L. Theory & Analysis of Experimental Designs. CBS Publishers & Distributors Private Limited, 2010.

Cairns & Cox. Research Methods for Human-Computer Interaction. Cambridge Univ Press. 2008.

Cargill, Margaret, and Patrick O'connor. Writing Scientific Research Articles: Strategy and Steps. Wiley-Blackwell, 2009.

Field, Andy and Hole, Graham. How to Design and Report Experiments. Sage. 2002.

Flick, Uwe. Introduction to Qualitative research. Sage. 2014.

Hofmann, Angelika H. Scientific Writing and Communication: Papers, Proposals, and Presentations. OUP USA, 2010.

Katz, Michael Jay. From Research to Manuscript: A Guide to Scientific Writing. 2nd ed. Springer, 2009.

Lazar, Jonathan , Feng, Jinjuan H,, and Hochheiser, Harry . Research Methods in Human-computer Interaction. Wiley Publishers. 2008.

Miller, Frederic P., Agnes F. Vandome, and John McBrewster. Illustration: Information Drawing, Painting, Photograph, Art, Technical illustration. Ed. Frederic P. Miller, Agnes F. Vandome, and John McBrewster. Alphascript Publishing, 2010.

Olson, Judith S. and Kellogg , Wendy A. (eds.) Ways of Knowing in HCI. Springer. 2014.

Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Prinicples and Practice, 2e. 2nd ed. OUP India, 2012.

Rodden, Harper and Sellen, Rogers (eds.). Being Human: Human-Computer Interaction in the Year 2020. Microsoft Research Ltd. 2008

Rogers, Yvonne. HCI Theory: Classical, Modern, and Contemporary, Synthesis Lectures on Human-Centered Informatics. Morgan & Claypool Publishers. 2012

Surhone, Lambert M., Miriam T. Timpledon, and Susan F. Marseken. Technical Illustration: Technical Drawing, Diagram, Line Drawing, Exploded View Drawing, Cutaway Drawing, Clip-Art, Parallel Projection, Perspective Projection. Ed. Lambert M. Surhone, Miriam T. Timpledon, and Susan F. Marseken. Betascript Publishing, 2010.

M-UE_05 Strategic Usability Engineering

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_05	150 h	5 CP	1st semester	Winter semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Lecture: 30 h / 2 semester hours per week (SWS) Seminar: 15 h / 1 SWS Excercise: 15 h / 1 SWS	60 h / 4 SWS	90 h	20 students

Learning outcomes / Competences and qualifications profile

Students are qualified to link the different perspectives and principles of both software engineering and usability engineering and have learned to utilize this knowledge in practice. Students have advanced their knowledge in process models and development lifecycles, as well as gained extensive knowledge of international standards for both disciplines. They can apply their knowledge of general guidelines for the development of human-centred products and the process of their design in practice. They are able to contrast current trends in system development management.

This code of practice will enable the students to assess and analyse pre-existing processes, define and specify human-centred design processes and to select the appropriate usability methods for use in practice.

Content

- Software engineering process and management models
- Human-centred design and management models
- Current trends in software and product development management (e.g. agile, lean UX, lean startup, jobs-to-be-done, design sprints)
- Standards in software engineering and usability engineering (e.g. ISO/IEC/IEE 12207, ISO/IEC/IEE 15288, ISO/TS 18152, ISO 9241-110, ISO 9241-210, ISO 9241-220, ISO/TR 16982)
- Systems and software product quality based on ISO/IEC TR 25060 (and associated documents)
- Requirements engineering (including usability requirements)
- Assessment and capability models for software engineering and usability engineering (e.g. CMMI or ISO/IEC 15504, ISO/TS 18152, ISO/TR 18529, KESSU, etc.)
- Legal aspects, accessibility and universal design

Teaching methods

Tuition in lectures, seminars and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment

Written/Oral examination

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Weight towards final grade

5,42%

Person in charge of module

 Prof. Dr. Karsten Nebe

Additional information

Cooper, Alan, Robert Reimann, and David Cronin. About Face 3: The Essentials of Interaction Design. 4th ed. Wiley, 2014.

Dix, Alan, Janet E. Finlay, Gregory D. Abowd, and Russell Beale. Human-Computer Interaction. 3rd ed. Prentice Hall, 2003.

ISO 9241-110:2006. Ergonomics of human-system interaction - Part 110: Dialogue principles.

ISO 9241-210:2010. Ergonomics of human-system interaction - Part 210: Human-centred design for interactive systems.

ISO/DIS 9241-220.2. Ergonomics of human-system interaction -- Part 220: Processes for enabling, executing and assessing human-centred design within organizations.

ISO/TR 16982:2002. Ergonomics of human-system interaction - Usability methods supporting human-centred design.

ISO/IEC 15288:2015. Systems and software engineering - System life cycle processes.

ISO/IEC TR 25060:2010. Systems and software engineering -- Systems and software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability: General framework for usability-related information.

ISO/TS 18152:2010. Ergonomics of human-system interaction - Specification for the process assessment of human-system issues.

ISO/IEC 12207:2008. Systems and software engineering - Software life cycle processes. (Will be replaced by ISO/IEC/IEEE 12207).

ISO 9241-20:2008. Ergonomics of human-system interaction - Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services.

ISO 9241-171:2008. Ergonomics of human-system interaction - Part 171: Guidance on software accessibility.

Mayhew, Deborah J. The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design. Morgan Kaufmann, 1999.

Schaffer, Eric & Apala Lahiri. Institutionalization of UX: A Step-by-Step Guide to a User Experience Practice. 2nd ed. Addison Wesley, 2013.

M-UE_06 Applied Research Project A

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_06	150 h	5 CP	1st semester	Winter semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Practical Training: 60 h / 4 semester hours per week (SWS)	60 h / 4 SWS	90 h	20 students

Learning outcomes / Competences and qualifications profile

Students have learned to apply the knowledge they have gained in other courses to their project work. They know how to do research and how to gather information by using different sources like literature, Internet or experts. They are able to write a convincing project report and to communicate project results in a professional way. They understand and practice how to do user studies with the target groups, to analyze the results adequately and to come up with suitable optimization proposals. Additionally, students will learn about a suitable time and task management and how to develop marketing ideas for their ideas and prototypes.

Due to this project experience students have improved their soft skills and their ability to work in a team.

Content

Students have to plan, realize, document and present their own projects by applying the knowledge they have gained in accompanying courses. The projects students choose should be related to current research projects of the faculty (such as AR and VR, as well as Smart Glasses) or can be realised by doing industrial internships. The focus of Research Project A is on analytical methods used in Usability Engineering and their realization, as well on suitable document and presentation methods.

Teaching methods

At the beginning of the semester the different projects are presented and teams are built. Project kick-offs and regular meetings will be initiated by the professors in charge who will also support the projects and will be available in case of problems and questions.

Entry requirements

None

Types of assessment

Report, presentation and prototype

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)
Weight towards final grade
5,42%
Person in charge of module
Prof. Dr. Kai Essig
Additional information
Literature depending on project

M-UE_07 UX Project Management

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_07	150 h	5 CP	2nd semester	Summer semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Lecture: 30 h / 2 semester hours per week (SWS) Exercise: 15 h / 1 SWS	45 h / 3 SWS	105 h	20 students

Learning outcomes / Competences and qualifications profile

User Experience is growing to become an integral quality aspect of software development, but it is not only an attribute of the generated product; it is also a fundamental attribute for the development process itself. Students have explored theory and practice of negotiating, with an emphasis on the improvement of processes as well as opportunities for marketing. Students are able to plan and perform project acquisition, manage human-centred design activities and to set up documentation processes in various organisational contexts. Students know techniques to estimate and control project costs, to set up schedules and to measure performance and success focusing on usability engineering.

Content

- Project acquisition, management and -documentation
- Roles, activities and responsibilities and their interplay (e.g. analyst, developer, interaction designer, information architect, graphical designer, marketing, product management, etc.)
- Artefacts (style-guides, requirements, specifications, prototypes, assets, etc.)
- Managing human-centred design in cross-disciplinary teams
- Cost justifying usability
- Indicate possibilities to put in to practice what students have learnt, e.g. by showing funding possibilities and experiences to become self-employed or to set up a spin-off company

Teaching methods

Tuition in lectures and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment

Written/ Oral examination

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Weight towards final grade
5,42%
Person in charge of module
Prof. Dr. Karsten Nebe
Additional information
Berkun, Scott. Making Things Happen: Mastering Project Management. O'Reilly Media, 2008. Davis, Barbee. 97 Things Every Project Manager Should Know: Collective Wisdom from the Experts. O'Reilly Media, 2009. Gray, Dave, Sunni Brown, and James Macanufo. Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers. O'Reilly Media, 2010.Institute. Project Management. A Guide to the Project Management Body of Knowledge. Project Management Institute, 2004.

M-UE_08 Digital Fabrication for Human-Interface Design

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_08	150 h	5 CP	2nd semester	Summer semester	1 semester

Courses	Teaching time	Self-study		Planned group size
Lecture: 30 h / 2 semester hours per week (SWS) Seminar: 15 h / 1 SWS Practical Training: 30 h / 2 SWS	75 h / 5 SWS	75 h		20 students

Learning outcomes / Competences and qualifications profile

Students have been introduced in the latest trends and techniques of digital fabrication. They have gained practical experiences in applying techniques used for prototyping of physical human-interfaces. They are able to create interactive prototypes that include physical input (sensors) and actuators to provide multi-modal (e.g. visual, tactile, auditive) feedback to the user. Students are able to test the prototypes with users according to their needs.

Content

- 2D and 3D-Design of physical objects for digital fabrication
- Production techniques (i.e. Laser-Cutting, 3D-Printing, CNC milling)
- Electronics for interaction design
- Learn similarities and differences between prototyping for physical and digital products
- Know what fidelity level is needed for different prototypes
- Get best practices for prototyping in a variety of mediums, and choose which prototyping software or components to use
- Learn electronics prototyping basics and resources for getting started
- Write basic pseudocode and translate it into usable code for Arduino
- Conduct user tests to gain insights from prototypes

Teaching methods

Tuition in lectures, seminars and (partially self-organized) practical trainings (in the FabLab). Students work individually and in teams.

Entry requirements

None

Types of assessment

Report, presentation and prototype

Requirements for the award of credit points
Passed assessment

Use of module (in other study programs)

Weight towards final grade
5,42%

Person in charge of module
Prof. Dr. Karsten Nebe

Additional information

Adenauer, Julian, Jörg Petruschat, and Angelika Petruschat. Prototype!: physical, virtual, hybrid, smart : tackling new challenges in design and engineering. Form + Zweck, 2012.

Anderson, Chris. Makers.. Makers.: Random House USA, 2014.

Bell, Charles A. Beginning sensor networks with Arduino and Raspberry Pi. New York: Apress ; New York, 2013.

Blum, Jeremy. Exploring Arduino : tools and techniques for engineering wizardry. Wiley, 2013.

Gershenfeld, Neil. Fab : the Coming Revolution on Your Desktop--from Personal Computers to Personal Fabrication.. Fab : the Coming Revolution on Your Desktop--from Personal Computers to Personal Fabrication.: Basic Books, 2008.

Gupta, Gourab Sen. Embedded Microcontroller Interfacing : Designing Integrated Projects. Embedded Microcontroller Interfacing Designing Integrated Projects: Springer-Verlag Berlin Heidelberg, 2010.

Hoskins, Stephen. 3D Printing for Artists, Designers and Makers. Bloomsbury Publishing, 2018.

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M-UE_09 Innovation and Design Thinking

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_09	150 h	5 CP	2nd semester	Summer semester	1 semester

Courses	Teaching time	Self-study		Planned group size
Lecture: 15 h / 1 semester hours per week (SWS) Practical Training: 30 h / 2 SWS	45 h / 3 SWS	105 h		20 students

Learning outcomes / Competences and qualifications profile

In this practical course, the students understand design thinking as a human-centred process of innovation. Working on some real-world challenge students collaborate with fellow students toward innovative solutions. They are able to identify opportunities and to transform these opportunities into requirements and concepts for future products that aim to achieve an optimum balance between usability and desirability from all stakeholders' perspectives. The students can apply techniques from design thinking and synthesis, are able to balance different design alternatives and can communicate the design rationales appropriately. Students are familiar with the strategy, process and implementation of design thinking and design management. They have gained knowledge of the breadth of principles, methods and practices of design management across the different design disciplines.

Content

- Strategic management and design management
- Design thinking and creativity methods
- Open innovation and user-centred innovation
- Innovative business models for new markets and digital culture

Teaching methods

Tuition in lectures and (partially self-organized) practical trainings. Students work individually and in teams.

Entry requirements

None

Types of assessment

Report and presentation

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Weight towards final grade
5,42%

Person in charge of module
Prof. Dr. Karsten Nebe

Additional information

Ambrose, Paul Harris Gavin. Design Thinking: Fragestellung, Recherche, Ideenfindung, Prototyping, Auswahl, Ausführung, Feedback. Stiebner Verlag Gmbh, 2010.

Brown, Tim. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. HarperBusiness, 2009.

Cooper, Rachel, Sabine Junginger, and Thomas Lockwood. The Handbook of Design Management. Ed. Rachel Cooper, Sabine Junginger, and Thomas Lockwood. Berg Publishers, 2011.

Gray, Dave, Sunni Brown, and James Macanufo. Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers. O'Reilly Media, 2010.

Greene, Jay. Design Is How It Works: How the Smartest Companies Turn Products into Icons. Portfolio Hardcover, 2010.

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Johnson, Steven. Where Good Ideas Come From: The Natural History of Innovation. Riverhead Trade, 2011.

Kelley, Tom. The Ten Faces of Innovation: Strategies for Heightening Creativity. Profile Books Ltd, 2008.

Liedtka, Jeanne, and Tim Ogilvie. "Designing for growth." New York, 2011.

Merholz, Peter, Todd Wilkens, Brandon Schauer, and David Verba. Subject To Change: Creating Great Products & Services for an Uncertain World. O'Reilly Media, 2008.

Osterwalder, Alexander, and Yves Pigneur. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons, 2010.

Stickdorn, Marc, et al. This is service design thinking: Basics, tools, cases. Vol. 1. Hoboken, NJ: Wiley, 2011.

Tidd, Joseph. Managing innovation. 4th ed. Hoboken, NJ: Wiley, 2009.

Verganti, Roberto. Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean. Harvard Business Press, 2009.

M-UE_10 Current Topics and Developments in HCI II

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_10	150 h	5 CP	2nd semester	Summer semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Seminar lecture: 30 h / 2 semester hours per week (SWS) Exercise: 30 h / 2 SWS	60 h / 4 SWS	90 h	20 students

Learning outcomes / Competences and qualifications profile

Students have learned to apply, adapt and extent the techniques taught in the course "Current Topics and Developments in HCI I" within the scope of a larger research project in the field of HCI. Additionally, students have internalized the fundamentals of scientific working and research practice, as well as how to design and realise their own ideas within (potentially praxis-related) relevant topics in HCI. Students have chosen a current topic in HCI and either extend an existing approach by their own and original ideas or to come up with their individual project proposals. While designing and realising their ideas, students have learned how to select, perform and analyse appropriate UE methods to implement their own ideas according to user needs. Students have further practised how to present and communicate their own work and results in an adequate academic form, as well as how to classify, explain and defend it in context of existing research. Where applicable the project can be conducted and implemented together with companies, research institutes, or other working/research groups.

Content

- Depending on the respective focus topics in HCI, such as:
    - Machine Intelligence and AI in HCI
    - Cognitive Systems
    - VR-/AR-Techniques in HCI
    - Actual approaches and development on Interactive Systems
    - HCI Techniques in the context of Industry 4.0 and Internet of the Things
    - Technical Systems to support handicapped people
    - HCI in the context of work psychology
- Extend an existing approach or to come up with own project ideas
- Select adequate domain and task specific research methods
- Planning, designing, and conducting experimental (comparative) user studies
- Practice, adapt and extent the various modes and forms of scientific writing and communication skills learned in the course "Current Topics and Development in HCI I".
- Classify, explain and defend own findings in context of existing research
- Analyzing and documenting user studies and findings properly (i.e. as a scientific presentation or paper)

- Depending on the progress and the outcomes the course will be complemented by a paper submission to a HCI conference.

Teaching methods

Tuition in seminars lectures and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment

Study, report and presentation

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Weight towards final grade

5,42 %

Person in charge of module

 Prof. Dr. Karsten Nebe

Additional information

Literature will be provided, depending on the focus of the course.

M-UE_11 Applied Interaction Design

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_11	150 h	5 CP	2nd semester	Summer semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Lecture: 30 h / 2 semester hours per week (SWS) Exercise: 30 h / 2 SWS	60 h / 4 SWS	90 h	20 students

Learning outcomes / Competences and qualifications profile

Students have gained knowledge of design principles and design elements for visual interface design. They understand the relationships between forms, shapes and colours, and the ways in which humans understand and perceive these relationships. The students have learned how to use this general knowledge in order to create interfaces for interactive systems. They know how to develop interfaces in a systematic way: starting with concepts based on requirements, through the development of wireframes and information architecture, specification of the design until its implementation as interactive prototypes. Students have gained practical experience in using various tools for prototyping and are able to reflect critically on the appropriateness of such tools in different project contexts.

Content

- Design principles and design elements
- Visual interface design and Sketching
- Communication of objectives, methods and concepts for the typical development phases
- Design methodology: requirements, concepts, wireframes, information architecture, design & specification, testing
- Prototyping for different platforms (e.g. desktop, mobile, physical hardware interfaces, web & responsive, etc.)
- examples from research and industry illustrate how new forms of interaction interfaces can be designed by an interdisciplinary approach

Teaching methods

Tuition in lectures and (partially self-organized) exercises. Students work individually and in teams.

Entry requirements

None

Types of assessment

Portfolio, report and prototype

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)

Weight towards final grade

5,42%

Person in charge of module

Prof. Dr. Karsten Nebe

Additional information

Buxton, Bill. Sketching User Experiences: Getting the Design Right and the Right Design. Morgan Kaufmann, 2007.

Cooper, Alan, Reimann, Robert, Cronin, David. About Face 3: The Essentials of Interaction Design. 3rd ed. Wiley, 2007.

Crawford, Chris. The Art of Interactive Design. Sunsoft Press, 2003.

Goodwin, Kim . Designing for the Digital Age: How to Create Human-Centered Products and Services. Wiley, 2009.

Morville, Peter, Rosenfeld, Louis. Information Architecture for the World Wide Web, 3rd Edition - Designing Large-Scale Web Sites. O'Reilly Media, July 2008.

Mullet, Kevin, Sano, Darell. Designing Visual Interfaces. Sunsoft Press, 1995.

Preece, Jenny, Rogers, Yvonne, Sharp, Helen. Interaction Design. Wiley & Sons, 2007.

M-UE_12 Applied Research Project B

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_12	150 h	5 CP	2nd semester	Summer semester	1 semester

Courses	Teaching time	Self-study	Planned group size
Practical Training: 60 h / 4 semester hours per week (SWS)	60 h / 4 SWS	90 h	20 students

Learning outcomes / Competences and qualifications profile

Students have learned to apply the knowledge they have gained in other courses to their project work. They know how to do research and how to gather information by using different sources like literature, Internet or experts. They are able to write a convincing report and to communicate project results in a professional way.

Due to this project experience students have improved their soft skills and their ability to work in a team.

Content

Students have to plan, realize, document and present their own projects by applying the knowledge they have gained in accompanying courses. The projects students choose should be related to current research projects of the faculty or can be realised by doing industrial internships. Research Project B focuses on recent trends, conceptual methods and approaches used in Usability Engineering.

Teaching methods

At the beginning of the semester the different projects are presented and teams are built. Project kick-offs and regular meetings will be initiated by the professors in charge who will also support the projects and will be available on case of problems and questions.

Entry requirements

None

Types of assessment

Report, presentation and prototype

Requirements for the award of credit points

Passed assessment

Use of module (in other study programs)
Weight towards final grade   5,42%
Person in charge of module   Prof. Dr. Karsten Nebe
Additional information   Literature depending on project

M-UE_13 Master Thesis and Colloquium

Code	Workload	Credits	Level of module	Frequency of offer	Duration
M-UE_13	900 h	30 CP	3rd semester	Winter semester	1 semester

Courses	Teaching time	Self-study		Planned group size
Master Thesis: 27 CP Colloquium: 3 CP	Depending on individual needs			

Learning outcomes / Competences and qualifications profile

Students have worked on a research topic of their interest in the scientific field of Usability Engineering. They have conducted intensive studies on literature and developed their research question. Students have developed appropriate methodological strategies concerning that question. They have conducted the approach focussing on specific details of the questions, have analysed the results and transferred their findings to the broader perspective of the field. They have reflected their work and findings critically and have come up with some further research questions. Student have proven that they are able to analyse a complex field of work, find specific new research questions as well as have been able to answer and document them.

During the colloquium students have presented their work and have proven their expertise in the field of work. They have been able to defend the topic and to reflect on its impact on real-life problems in a professional way.

Content

- Researching and evaluating literature
- Developing a research question and deriving hypotheses
- Analysing methodological strengths and weaknesses of different research approaches
- Developing research designs
- Conducting the studies
- Evaluating and documenting the results
- Writing the thesis
- Presenting and defending the findings

Teaching methods

Individual supervision and support

Entry requirements

60 credits points achieved in other courses of the curriculum

Types of assessment

Written Master thesis and oral disputation

Requirements for the award of credit points
Passed Master thesis and disputation as well as successful completion of all other modules of the curriculum

Use of module (in other study programs)

Weight towards final grade
35%

Person in charge of module
All professors of the faculty

Additional information