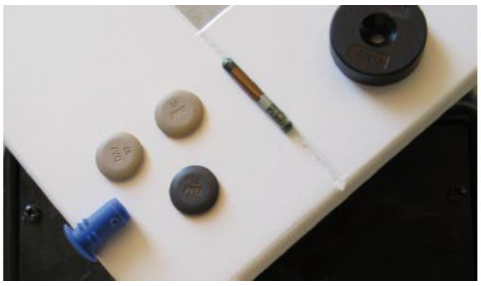
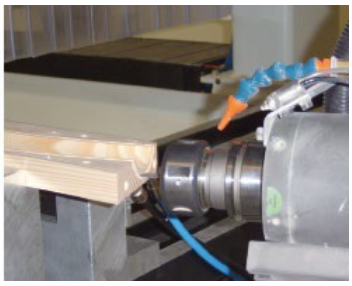
Berner Fachhochschule
Haute école spécialisée bernoise
Bern University of Applied Sciences

Master Wood Technology

Offered jointly by

Bern University of Applied Sciences,
Architecture, Wood & Civil Engineering, Biel/Bienne (Switzerland)

University of Applied Sciences, Rosenheim (Germany)

Module Catalogue BFH, Biel

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PC Timber Engineering - MBW1021

ECTS	6
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Lehmann Martin, Renfer Christoph
Module responsibility	Dr.-Ing. Martin Lehmann Phone: +41 (0)32 344 03 21 E-Mail: martin.lehmann@bfh.ch
Short description of the module	This preparatory course is designed for students without or little experience in timber engineering. You establish knowledge in timber engineering by independent textbook reading, supplemented by classroom coaching.
Content	Timber engineering according to EC5 and SIA 265
Teaching and Learning form	Text book reading and classroom coaching
Literature	• Timber Engineering - Principles for Design (https://publikationen.bibliothek.kit.edu/1000069616) • EN 1995-1-1 • SN EN 1995-1-1 NA:201 • SIA 265:2021 • SIA 265-1:2018 • EN 1990 • EN 1991-1
Student Working Hours	Overall workload, including book reading and exam preparation: 6 ECTS credits = 180 h
Contact lessons	24 lessons
Proof of competence	one assignment due in December, the task will be handed out one week before the deadline and one written exam will take place in December (duration: 210 min) In order to pass the exam and assignment, all subtasks of the exam as well as all subtasks of the assignment must be sufficient.
Aids for written examination	open book

PC Timber Engineering - MBW1021

Mode of repetition	Only one repetition of the exam and the assignment is possible. The repetition of the exam and the assignment will take place in January (only the failed subtasks must be repeated). In order to pass the exam and assignment, all subtasks of the exam as well as all subtasks of the assignment must be sufficient.
Comment	failure of the second exam and or the second assignment leads to exmatriculation
Weblink(s)	Timber Engineering - Principles for Design Grundlagen der Bemessung

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PC Wood Science - MBW1022

ECTS	2
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Mayer Ingo, Thömen Heiko
Module responsibility	Prof. Dr. Ingo Mayer Phone: +41 (0)32 344 03 43 E-Mail: ingo.mayer@bfh.ch
Short description of the module	Get the basics! This preparatory course is designed for students without experience in wood science. You establish knowledge in biology, chemistry and physics of wood by independent text book reading, supplemented by classroom coaching.
Content	- Wood biology and anatomy - Decay and weathering of wood, protection solutions - Cell wall chemistry and ultra-structure - Wood physics and mechanical properties of wood
Teaching and Learning form	Text book reading, e-learning and classroom coaching
Literature	R. Shmulsky, P. D. Jones (2011) Forest Products & Wood Science - an introduction (sixth edition), Wiley-Blackwell, chapter 1 - 10
Student Working Hours	Overall workload, including book reading and exam preparation: 4 ECTS credits = 120 h Of which registered and entered in the transcript of records: 2 ECTS credits
Contact lessons	4 lectures
Proof of competence	Written Exam 60 min.

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PC CAD-Work - MBW1025

ECTS	2
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Berthoud Willy
Module responsibility	Willy Berthoud
Short description of the module	Learners acquire basic knowledge of cadwork 3D and 2D, as well as additional knowledge for complex structures.
Admission	no special requirements
Entry requirements	no special requirements
Presupposed modules	none
Competencies upon completion	Students will be able to use a CAD system efficiently. They are able to implement more complex structures which are designed in the draft and the static analysis.
Content	Basics in 2D: auxilaire lines, lines, surfaces, dimensions, texts, copie, move, strech Basics in 3D: beam, panels, connectors, wood connection 3D output: automatic plan, part lists, bimteam (CDE) Advance: Knowledge of various implemented modules. Export functions and display options with the CAD. Point Cloud and interface static software (Dlubal, R-Stab, RFEM)
Teaching and learning form	Technical input and work on the CAD system
Literature	CADWORK Tutorials and videos
Student Working Hours	50 hours
Contact lessons	40 lessons
Self-study	10 hours
Attendance requirement	Yes

PC CAD-Work - MBW1025

Competency assessment	90-minute test 3D - 2D - lists-bimteam, The condition for admission to the test is to have completed and submitted (moodle) exercises distributed during the course. Attendance is mandatory on the last day of class. Working with the CAD - Timber construction in 3D - plan composition in 2D with dimensions and texts, part list, - Output CDE bimteam
Aids for written examination	all aids allowed
Mode of repetition	Competency assesment can be repeated once.
Weblink(s)	cadwork.com

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PC Wood-Based Panels & Wood Processing - MBW1026

ECTS	2
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Thömen Heiko
Module responsibility	Prof. Dr. Heiko Thoemen heiko.thoemen@bfh.ch +41 32 344 0331
Short description of the module	This preparatory course is designed for students without experience in wood technology. You establish knwledge in properties, use and production technologies of wood-based panel (plywood, medium density fiberboard, particleboard, cross-laminated timber), recycling and reuse of wood, and wood processing by independent text book and article reading, supplemented by classroom coaching.
Content	• Veneer, fiber and particle-based panels • Cross-laminated timber (CLT) • Recycling and reuse of wood • Wood processing
Teaching and Learning form	Text book reading and classroom coaching
Literature	Thoemen, H., M. Irle and M. Sernek (2010): Wood-Based Panels - An Introduction for Specialists. Microsoft Word - SOTA E49_2010_06_23_new_ (cost.eu) Other literature will be announced during the module.
Student Working Hours	Overall workload, including book reading and exam preparation: 2 ECTS credits = 60 h
Contact lessons	12 lectures
Proof of competence	Oral exam (30 minutes) or written exam (30 minutes), depending on size of class

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PC Lean Production - MBW1042

ECTS	1
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Letsch Bernhard
Module responsibility	Bernhard Letsch Phone: +41 (0)32 344 03 06 E-Mail: bernhard.letsch@bfh.ch Lecturer: Bernhard Letsch
Short description of the module	This preparatory course is designed for students (specialization MPI) without experience in lean production. You establish knowledge in this topic by independent text book reading, supplemented by classroom coaching.
Competencies upon completion	The students understand the concept of the Toyota Production System (TPS) and know the most important tools of TPS.
Content	- Philosophy of the Toyota Production System (TPS) - Tools of TPS (6S, Kaizen, Poka Yoke, Value Stream Design, Kanban, SMED..)
Teaching and Learning form	Text book reading and classroom coaching
Literature	- Modig, N. / Åhlström, P. (2015): This Is Lean, Resolving The Efficiency Paradox, Halmstad: Rheologica - Liker Jeffrey, The Toyota Way - Shigeo Shingo, A Study of the Toyota Production System - Shigeo Shingo, The sayings of Shigeo Shingo: Key Strategies for Plant Improvement - Goldratt, Eliyahu M. / Cox Jeff, The Goal
Student Working Hours	Overall workload, including book reading and exam preparation: 2 ECTS credits = 60 h Of which registered and entered in the transcript of records: 1 ECTS credits
Contact lessons	4 lectures
Proof of competence	- Presentation - Oral test

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PC Business Administration and Marketing - MBW1043

ECTS	2
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Rascón Alberto
Module responsibility	Bernhard Letsch Phone: +41 (0)32 344 03 06 E-Mail: bernhard.letsch@bfh.ch Lecturer: Alberto Rascón
Short description of the module	This preparatory course is designed for students without experience in business administration and marketing. You establish knowledge in this topic by independent text book reading, supplemented by classroom coaching.
Competencies upon completion	Unterstanding the basics of acccounting and financial statements
Content	Introduction to accounting and financial statements. Basic concepts: Assets, Liabilities and Equity Definitions of current assets, current liabilities and working capital. Introduction to financial statements Introduction to valuation and present value Introduction to the concept of demand and to business models
Teaching and Learning form	Text book reading and classroom coaching
Literature	- Pratt, J. (2013), Financial Accounting in an Economic Context (9th edition), John Wiley & Sons. - Brealey Richard, Myers Stewart Allen Franklin, Principles of Corporate Finance (February 28, 2019) 13th Edition McGraw-Hill Education;
Student Working Hours	Overall workload, including book reading and exam preparation: 4 ECTS credits = 120 h Of which registered and entered in the transcript of records: 2 ECTS credits
Contact lessons	6 lectures
Proof of competence	Individual Presentation of a selected topic (30 minutes)

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PC Project Timber Structures - MBW1045

ECTS	5
Study language	English
Module type	Optional module (non-countable)
Lecturer(s)	Lehmann Martin, Renfer Christoph
Module responsibility	Christoph Renfer
Short description of the module	Design of an ongoing project for a pedestrian bridge or industrial hall including the editing of the user agreement and project base. Design and presentation of proof of concept per person, subsequent preliminary design of structure and connections and presentation in small groups.
Admission	Admission to MAster Wood Technology and personel interview
Competencies upon completion	**Professional competencies (course-specific)** - Development of load-bearing systems and structural design process - Application of theoretical knowledge within the framework of a larger practical work - Independent development and processing of a technical task - Communicating technical projects to different target audiences - Grasping complex issues and reducing them to the essentials **Methodological competencies (typical for the module)** - Project planning: deadlines, meetings, discussion and presentation techniques - Processing information: recording, summarising, storing, filing - Conceptual work: evaluating, linking and prioritising information; tailoring knowledge to the topic of the project work - Developing a methodical approach: Formulate goals, choose appropriate methods - Developing the ability to communicate (different audiences): in writing and orally **Cross-cutting competencies** - Perfecting personal work technique - Deepen understanding of more complex tasks - Develop ability to analyse and criticise - Ability to articulate oneself in group processes - Recognising one's own role (strengths / weaknesses) in the team - Get to know leadership tasks
Composition	3 week independent work, 3 months group work with intermediate and final presentation, coaching by professor
Content	**Project** Draft of load bearing structures and proof of concepts (design of main section and overal stability). Predimensioning of structural members, constructional concept for protection against humidity, mounting concept,set of engineering plans. **Methodology and science** - Delimitation of topic, question and title of the work - Identifying, analysing and linking sources of information - Structuring the work - Time planning, work programme - Organisation in a team - Methods and forms of scientific-technical work - Language and source work (formulating, quoting, etc.)

PC Project Timber Structures - MBW1045

Teaching and Learning form	Self study and group coaching during organized sessions
Literature	SIA / SN EN Blaß, Hans Joachim; Sandhaas, Carmen (2016):Timber Engineering - Design principles, KIT Scientific Publishing
Contact lessons	2L: Introduction to project Defined coaching sessions
Self-study	100% self study, individual and group work, report and presentations
Assessment proportion	60 % report, 20 % plans and documentation, 20 % presentations
Assessment schedule	Presentation: end of term Handing in report: 2 week after presentation
Mode of repetition	One-time rework of reports and calculations possible

Finite Element Method - MBW1132

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Lehmann Martin, Locher Jan, Renfer Christoph, Rombach Roland
Module responsibility	Prof. Dr. Christophe Sigrist Phone: +41 (0)32 344 03 76 E-Mail: christophe.sigrist@bfh.ch Lecturers/tutors : Dr. Christophe Sigrist, Dr. Steffen Franke, Dr. Driton Komani, Dr. Martin Lehmann, Roland Rombach
Requirements	Admission to the Master Wood Technology, specialization CTS
Competencies upon completion	In timber engineering it is only possible to achieve high-performance and cost-efficient solutions through the optimum use of materials and to implement them in structures in order to make the best usage of the specific material properties. Next to gaining this basic understanding the following goals are targeted: to correctly model complex, load carrying structures to appreciate various border conditions leading to fundamentally differential results to be able to systematically approach, develop and analyse interdisciplinary tasks to feel comfortable with complex mathematical formulations and equations to be able to use various tools / programs to solve engineering tasks to be able to check the plausibility of results from selected models and applied tools
Composition	64 Lectures/Seminar Attendance mandatory - special permission for absence needed
Content	- Relevant aspects of advanced methods for technical mathematics (tensor calculation, calculation of variation, differencial equations of higher order), 20 lectures / tutorial (D. Komani) - Material models and stifness matrix for members and structures, 10 lectures / tutorial (S. Franke) - Modelling and theory (orthotropic materials, sections as composition of layers, plate theory, panel theory, shell theory), 16 lectures / tutorial (R. Rombach) - Calculation of 2nd order (ultimate load, buckling modes of systems, Eigen-frequency, bifurcation problem, local buckling of shellls), 12 lectures / tutorial (M. Lehmann / C. Sigrist) - Evaluation of results (systematic approach to analysis and plausibility checks, presentation / summary of results), 6 lectures / tutorial (M. Lehmann und C. Sigrist)
Teaching and Learning form	- Mandatory participation in lectures - Tutorials - Group work and presentations
Literature	Relevant literature from library according to individual needs

Finite Element Method - MBW1132

Student Working Hours	5 ECTS credits = 150 h
Contact lessons	64 contact lessons, including laboratory work
Assessment proportion	Written exams and / or marked individual/group assignments Resources during the exam: Open book / none depending on the test / examinated content

Timber Construction Basics - MBW1234

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Engels Isabel, Geiser Martin, Geyer Christoph, Käser Philip, Renfer Christoph
Module responsibility	Martin Geiser

Short description of the module

The Timber Construction Basics module provides practical knowledge on key aspects of modern timber construction, particularly for medium-height buildings. The main topics are:

Timber Construction (50 %)
- Timber construction systems and building envelope
- Design principles for timber bracing systems
- Diaphragm action, force distribution and force transmission
- Timber frame construction: shear walls and diaphragms
- Timber protection, durability and maintenance
- Erection process
- Examples

Building Physics (30 %)
- Basics regarding heat, moisture, airtightness and sound
- Practical implementations for roofs, exterior walls, partitions walls and slabs
- Practical implementations for building component connections

Fire Protection (20 %)
- Basics regarding reaction to fire and fire protection
- Insight into fire protection design with requirements and solutions
- Practical implementation for components with fire protection requirements

Entry requirements

Participants in the module lessons have prior knowledge of the following areas:

- Wood and wood-based building materials: - knowledge of the properties, possible applications and limitations of wood and wood-based materials
- Reinforced concrete and steel construction: Understanding of the basic principles, how the materials behave, and the typical areas of application.
- Timber engineering: Basic knowledge of structural design, construction and connections.
- Structural analysis and dimensioning: Solid knowledge of structural analysis and verification for members and connections.
- Construction of two- and three-storey timber buildings: Understanding of planning and construction principles for smaller timber buildings. Basic knowledge of structural timber protection.
- CAD skills: Experience of using 2D CAD software for creating technical drawings and planning structural concepts and timber constructions.

This prior knowledge will form the basis for an in-depth understanding of, and interdisciplinary application to, the content taught in class.

Timber Construction Basics - MBW1234

Competencies upon completion

Methodological skills:
- Processing information: recording, linking and summarising.
- Concept work: recording, analysing, linking, prioritising and applying information in a target-oriented manner.
- Systematic order processing involves defining objectives/requirements, concept/design work, development/calculation, and presenting results.

Overarching competences:
- Acquire personal work techniques
- Develop an understanding of complex tasks.

Technical skills (focus on medium-height buildings).
- Design of multi-storey buildings
- Connections
- Exterior walls
- Appropriate fire protection

Content

Timber Construction (50 %)
- Timber construction systems and building envelope
- Design principles for timber bracing systems
- Diaphragm action, force distribution and force transmission
- Timber frame construction: shear walls and diaphragms
- Timber protection, durability and maintenance
- Examples

Building Physics (30 %)
- Basics regarding heat, moisture, airtightness and sound
- Practical implementations for roofs, exterior walls, partitions walls and ceilings
- Practical implementations for building component connections

Fire Protection (20 %)
- Basics regarding reaction to fire and fire protection
- Insight into fire protection design with requirements and solutions
- Practical implementation for components with fire protection requirements

Teaching and learning form

- Theory input via lectures
- Discussions
- Processing and discussion of exercises

Literature

Kolb J. et al. (2024): Holzbau mit System, Birkhäuser Verlag, Basel
Normen SIA 260, 261, 265, 265/1
DIN EN 1995-1-1/NA
Lignum (2021) Holzbautabellen HBT1
Lignum (2021) Bemessungsbeispiele zur Norm SIA 265:2021
Lignum (2023) Dokumentation Erdbebengerechte Holzbauten
Colling (2025) Aussteifung von Gebäuden in Holztafelbauart
Informationsdienst Holz (2024) Bemessung von aussteifenden Deckentafeln nach dem Schubfeldträger-Modell
Lignum-Dokumentationen Brandschutz 1.1, 1.2, 4.1, 4.2, 7.1
Further literature, as specified by the lecturer

Student Working Hours

Total 5 ECTS = 150 h
Timber Construction: ca. 75 h
Buildings Physics: ca. 40 h
Fire Protection: ca. 35 h

Contact lessons

Timber Construction: 28 lessons (50 %)
Buildings Physics: 16 lessons (30 %)
Fire Protection: 12 lessons (20 %)

Timber Construction Basics - MBW1234

Self-study	Timber Construction: 65 % Buildings Physics: 60 % Fire Protection: 60 %
Competency assessment	An individual task including report and presentation
Weighting	Timber Construction: 50 % Buildings Physics: 30 % Fire Protection: 20 %
Aids for written examination	tbd
Weblink(s)	www.bsvonline.ch

Leadership and Communication - MBW1133

ECTS	5
Study language	English
Module type	Compulsory module
Lecturer(s)	Winterberg Norbert
Module responsibility	Prof. Norbert Winterberg Phone: +41 32 344 17 74 E-Mail: norbert.winterberg@bfh.ch Lecturers/tutors: Prof. Norbert Winterberg
Entry requirements	Admission to Master Wood Technology
Competencies upon completion	Upon successful completion of the course, students will have the following competencies: - Understanding the Five Practices of Exemplary Leadership and their application in various leadership scenarios. - Enhancing communication skills, particularly in leadership and feedback contexts. - Applying personality and intercultural tools (e.g., IDI) to better understand leadership dynamics. - Managing human resources from a leadership perspective, including team management and motivation. - Ethical decision-making, trust-building, and the development of credibility in leadership roles.
Content	This course will cover the following topics: - Introduction to Leadership: Core leadership theories and models. - The Five Practices of Exemplary Leadership: Model the Way, Inspire a Shared Vision, Challenge the Process, Enable Others to Act, Encourage the Heart - Communication in Leadership: Communication strategies, giving and receiving feedback, and fostering open communication. - Personality and Intercultural Tools: Understanding leadership from a cultural perspective using tools like the IDI. - Human Resource Management and Leadership: Aligning leadership practices with HR strategies. - Leadership Ethics: Building credibility, trust, and ethical decision-making. - Reflection and Personal Development: Creating personal leadership development plans.
Teaching and learning form	This course will employ a variety of teaching methods, including interactive lectures, practical workshops, and group activities. Students will engage in case studies, role-playing, and group discussions to practice leadership skills in real-world scenarios. Reflective journaling and peer feedback will be incorporated to support continuous personal and professional development.
Literature	Primary Text: Kouzes, J. M., & Posner, B. Z. (2023). The Leadership Challenge (7th edition). Supplementary Materials: Additional readings and resources will be provided throughout the course to complement the primary text and support deeper engagement with key concepts.
Student Working Hours	5 ECTS credits = 150 h

Leadership and Communication - MBW1133

Contact lessons	64 contact lessons.
Attendance requirement	Active participation in all sessions is essential for the learning process and crucial to the development of leadership skills. Students are expected to attend all scheduled classes and activities. In the event of absence, official documentation, such as a medical certificate, or prior approval from the lecturer is required. Excessive unexcused absences may result in a lower final grade or the need for additional makeup work. Active participation is not only required but is also key to personal and professional growth as a leader.
Competency assessment	This course is designed to assess both theoretical understanding and the practical application of leadership concepts. Competencies will be evaluated through a blend of reflective written work, group collaboration, and participation in class activities, along with a final presentation. The assessment structure ensures students demonstrate not only their grasp of leadership theories but also their personal growth, the development of leadership skills, and the ability to reflect on feedback and apply it to improve as a leader.
Weighting	The final grade will be determined through a combination of participation and a final presentation. - 50% of the grade will be based on participation in assessments, including written assignments (reflective essays), group projects (collaborative case studies and presentations), and active participation in discussions, role-playing, and feedback sessions. - 50% of the grade will come from a final presentation, where students will share their key learning points from the course and present a personal leadership action plan. This presentation will include a statement of intent, outlining their leadership aspirations and how they plan to implement the principles learned during the course, emphasizing the role of self-reflection in leadership growth.
Costs	About 150 CHF for IDI personality tool

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Wood-Based Panels - Theory and Laboratory - MBW1134

ECTS	5
Study language	English
Module type	Compulsory module
Lecturer(s)	Mayer Ingo, Pichelin Frédéric, Thömen Heiko
Module responsibility	Heiko Thoemen Phone: +41 (0)32 344 03 31 E-Mail: heiko.thoemen@bfh.ch
Short description of the module	Wood-based panels such as medium density fiberboard (MDF), particleboard, oriented strand board (OSB) and plywood are used for a wide range of applications in the building and furniture sector. Students will gain an in-depth understanding of the production, applications and market situation of wood-based materials. The course combines theory, practical knowhow and laboratory work.
Admission	Admission to Master Wood Technology, Specialization MPI
Competencies upon completion	Course participants will gain fundamental knowledge about the production, properties and uses of wood-based panels, with a focus on fiber- and particle-based products such as MDF, particleboard and OSB. Above, they will have the competence of laboratory scale production and testing of boards.
Content	- Production technology of natural fiber- and particle-based panels - Testing methods of physio-mechanical properties - Indoor air quality and product emissions (fundamentals, regulations, testing methods) - Adhesives for wood-based panels - Physical mechanisms relevant during hot pressing - Uses and markets for wood-based panels - Process - structure - property relationship of wood-based panels
Teaching and Learning form	- Lectures / seminar - Hands-on laboratory work in small groups - Computer simulations - Self-study
Literature	Will be announced during the course.
Student Working Hours	5 ECTS credits = 150 h
Contact lessons	64 contact lessons, including laboratory work

Wood-Based Panels - Theory and Laboratory - MBW1134

Self-study	The self-study will include the following elements: - Preparation and follow-up of the lectures - Independent in-depth study of content and additional literature - Group work, preparation of presentations - Exam preparation
Attendance requirement	Attendance of all contact lessons including lab work and presentations is compulsory. Exceptions must be approved in advance by the person responsible for the module.
Proof of competence	The final grade consists of two parts: - Presentation of Lab Project (50%) - Written Exam, 60 Minutes (50%)
Assessment schedule	Dates will be announced no later than 2 weeks after the beginning of the semester.

Scientific Methods - MBW1232

ECTS	5
Study language	English
Module type	Compulsory module
Lecturer(s)	Chabrelie Aude, Holmes Christopher, Mayer Ingo, Proske Dirk
Module responsibility	Ingo Mayer Phone: +41(0)32 344 03 43 E-Mail: ingo.mayer@bfh.ch Lecturers/tutors: Dr. Aude Chabrelie, Dr. Ingo Mayer, Dr. Dirk Proske, Christopher Holmes
Entry requirements	Admission to Master Wood Technology
Competencies upon completion	The students: - will have a clear idea of the scientific method and accurately judge the quality of a thesis - can structure and plan empirical research in a meaningful way and will have mastered the statistical operations for the analysis of empirical data - will be able to use key methods of applied statistics confidently - will understand the goals of sustainable development processes, know relevant labels and standards for the sustainability assessment in practice and master techniques to optimize the environmental influences of projects, products and companies.
Structure	3 x 45 min. per week Lecture / Seminar 2 x 45 min. per week tutorial Attendance mandatory - special permission for absence needed 150 hours, where of: - 40h Lecture / Seminar - 56h Tutorial with assignments - 54h Independent Study
Content	**Contents (summary)** The module provides the basis for a thesis with substance and solid results, thanks to the expertise to plan empirical studies, statistically evaluate and present them in a suitable form. Furthermore, the main processes and methods of environmental management will be taught. **Contents** - Scientific method (2 ECTS): planning, executing and evaluating empirical studies, scientific writing - Applied Statistics (2 ECTS): derivation of characteristics of a population from samples, scatter, confidence intervals, significance of differences, correlation and regression, presenting extensive empirical data - Environmental Management (1 ECTS): Agenda 2030 for sustainable development, labels and standards, LCA methods, Environmental Product Declaration (EPD)
Literature	On Being a Scientist. A guide to responsible conduct in research. Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2009
Competency assessment	- Writing an independent scientific report - Written exam - Tutorial with assignments

Scientific Methods - MBW1232

Weighting

The final module grade is composed of the three partial grades of the individual courses as follows

- Scientific method: 40%
- Applied Statistics: 40%
- Environmental Management: 20%

Assessment schedule

During semester:
- Writing an independent scientific report
- Tutorial with assignments

By end of the semester:
- Written exam

Fiber-Reinforced Composites - MBW1233

ECTS	5
Study language	English
Module type	Compulsory module
Lecturer(s)	Garcia Vogel Andres, Mayer Ingo
Module responsibility	Ingo Mayer Phone: +41 (0)32 344 03 43 E-Mail: ingo.mayer@bfh.ch Further lecturers: Julien Rion (Bcomp) Reto Aebischer (Bcomp) Régis Voillat (Bcomp) Andrés Garcia Vogel
Short description of the module	Bio-based fibers are nowadays increasingly combined with other materials in order to create new profiles of properties and hence advanced applications. In this module, students learn the basics of fiber-reinforced materials, including bio-based fibers, especially long fibers such as flax. The module follows a holistic approach and includes theoretical blocks and practical laboratory work.
Admission	Admission to Master Wood Technology
Presupposed modules	Admission to Master Wood Technology
Competencies upon completion	Professional competencies: - Basic understanding of composite materials - In-depth knowledge of high-performance matrix materials reinforced by conventional and bio-based fibers such as annual plant fibers Methodological skills: - Laboratory work: Hand-laminating composites; mechanical testing - Work-sharing elaboration of a complex topic in a group - Presenting to a group
Content	The module will introduce the technology of fiber reinforced composites with the following focal topics: - Manufacture, properties and uses of material composites - Boundary layers and bonding - Analytical determination of characteristics of materials - Bio-based raw materials, including annual plant fibers and other long fibers

Fiber-Reinforced Composites - MBW1233

Teaching and learning form

The following forms of teaching and learning are planned:
- Interactive lessons
- Laboratory work
- Project, case study
- Presentations
- Report writing
- Excursion

Literature

Will be announced during the course.

Student Working Hours

5 ECTS credits = 150 h

Contact lessons

64 contact lessons, including laboratory work

Self-study

The self-study will include the following elements:
- Preparation and follow-up of the lectures
- Independent in-depth study of content and additional literature
- Group work, preparation of presentations

Attendance requirement

Attendance of all contact lessons including lab work and presentations is compulsory, if not otherwise indicated. Exceptions must be approved in advance by the person responsible for the module.

Competency assessment

The final grade consists of two parts:
- Oral presentation of lab project (1/3)
- Written report of lab project (2/3)

Assessment schedule

Dates will be announced no later than 2 weeks after the beginning of the semester.

Ecodesign of Products and Buildings - MBW3041

ECTS	5
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Chabrelie Aude, Foord Daniel, Frecè Jan Thomas, Fuchs Patrick, Hischier Roland, Stucki Tobias, Youssef Ahmad
Module responsibility	Prof. Dr. Aude Chabrelie Tel. 031 848 63 43 Email: aude.chabrelie@bfh.ch Lecturers: Aude Chabrelie, Roland Hischier, Tobias Stucki, Daniel Foord, Jan Frecè, Patrick Fuchs
Short description of the module	Based on a case study you develop sustainable products, processes and strategies for the wood industry and building sector to support the transition toward circular economy and to meet climate goals. You work iteratively. First, you assess the initial situation. Then, you conduct two redesign steps to reduce the environmental impacts significantly.
Admission	Admittance to MWT.
Entry requirements	Product development, Basics of sustainability, basics of Life Cycle Assessment, Wood and plants materials science (for MPI), wood construction and engineering (for CTS).
Presupposed modules	Course «Environmental Management» in Module MBW1232 «Scientific Method» or simultaneously. The module «LCA of Construction Products» is recommended.
Competencies upon completion	Professional competencies: The participants understand and integrate life cycle thinking in their professional tasks. They develop sustainable alternative products, processes and strategies with a smart use of available resources. The solutions offer as much possible benefit for all value chain stakeholders with the lowest environmental impact as possible and in the fairest conditions as possible. The participants assess critically, judge and communicate the sustainability of developed solutions and contribute to the circular economy in the wood sector. Methodological skills: - Command of Life Cycle Assessment software, databases and Ecodesign tools - Evaluation of environmental impacts with Life Cycle Assessment - Evaluation of social impacts with Life Cycle Assessment - Evaluation of economic performance with Life Cycle Costing - Assessment of Life Cycle of buildings and building materials following EN 15804 - Implementation of Ecodesign strategies - Development of innovative and creative solutions for a circular economy in the wood sector
Content	The module will introduce the method of ecodesign with the following focal topics: - Circular Economy (principle, circular strategies, business models, value chain) - Product life cycle and use phases of products and buildings - Principles, methods, tools and instruments of Ecodesign - Environmental Life Cycle Assessment - Social Life Cycle Assessment - Life Cycle Costing - Challenges of the wood sector for Ecodesign - Communication of sustainability assessment

Ecodesign of Products and Buildings - MBW3041

Teaching and learning form

The following forms of teaching and learning are planned:
- Interactive lectures/game/company visit/coaching
- Project, case study
- Presentations and reporting
- Inverted classroom
- Self-study

Time frame

18.09.25 - 22.01.26

Literature

- KATCH_e : Training for Circular Economy in the Construction and Furniture Sectors.
- Wimmer W, Züst R, Lee K-M (2004) ECODESIGN Implementation: A Systematic Guidance on Integrating Environmental Considerations into Product Development. Springer, Dordrecht, The Netherlands

Student Working Hours

125-150 hours, where of:
- 39 h contact hours (lectures, coaching)
- 6 h excursion
- 80-105 h self-study, homework and cases study

Contact lessons

60 lectures

Self-study

The self-study will include the following elements:
- Preparation and follow-up of the lectures
- Independent in-depth study of content and additional literature
- Group work on case study, preparation of reports, factheets and presentations

Attendance requirement

Attendance of all lessons including presentations is compulsory. Exceptions must be approved in advance by the person responsible for the module.

Competency assessment

Reports and group presentations of an ecodesign solution.

Weighting

First submission (assessment of reference situation): 25%

Second submission (first improvement to reduce the impacts): 25%

Third submssion (second improvement to reduce the impacts): 50%

Bio-based Polymers and Adhesives - MBW3042

ECTS	5
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Frei Reto, Mayer Ingo, Tanner Philipp
Module responsibility	Prof. Dr. Ingo Mayer Tel. +41 32 344 03 43 Email: ingo.mayer@bfh.ch
Short description of the module	Bio-based polymers and adhesives play an important role in a sustainable bioeconomy of tomorrow. Students will gain an in-depth understanding of the resources, the conversion and production processes and the application of such products. An understanding of the environmental impact throughout the product life cycle is an integral part of the module.
Admission	Admission to Master Wood Technology, Specialization MPI.
Entry requirements	Preparatory course Organic Chemistry or basic knowledge in organic chemistry from completed bachelor studies.
Competencies upon completion	Professional competencies: Course participants will gain expert knowledge about resources, the conversion and production processes and the application of bio-based polymers and adhesives. In particular, they will have the competence to identify a suitable bio-based polymer or adhesive for a given application based on processing properties, performance characteristics, costs and environmental impact.
Structure	- 40 h lectures/seminar - 24 h guided laboratory work - 86 h group work, self study
Content	- Sustainable resources - Conversion routes and production technology of bio-based polymer intermediates - Bio-based polymer and adhesive systems, their processing and products properties and their environmental impact - Uses and global markets for bio-based polymers and adhesives - Testing-methods of adhesion and processing properties
Teaching and learning form	- Lectures/seminar - Hands-on laboratory work in small groups - Self Study
Literature	Will be announced during the course.

Bio-based Polymers and Adhesives - MBW3042

Student Working Hours	150 hours
Contact lessons	64 contact lessons, including laboratory work.
Self-study	The self-study will include the following elements: - Preparation and follow-up of the lectures - Independent in-depth study of content and additional literature - Group work, preparation of presentations - Exam preparation
Attendance requirement	Attendance of all lessons including presentations is compulsory. Exceptions must be approved in advance by the person responsible for the module.
Competency assessment	The final grade consists of two parts: - Presentation of Project (30%) - Written Exam, 60 Minutes (70%)
Assessment schedule	Dates will be announced in the starting lecture of the module.

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Fundamentals in Data Management - MBW2110

ECTS	3
Study language	English
Module type	Elective module
Lecturer(s)	Augustynowicz Edyta, Standtke Ronny
Module responsibility	Edyta Augustynowicz Phone: + 41 77 417 38 35 E-Mail: edyta.augustynowicz@bfh.ch
Short description of the module	Understanding and analyzing information has always been vital for humans. Processing and interpreting data helps us understand our world and make decisions. In today's digital world, managing data has become even more essential. The goal of the course on the Fundamentals in Data Management is to provide students with a broad understanding of the key principles of data and data management. The course will last 8 weeks, and is divided into 3 main topics: 1) **Concept**: Data and data base, 2) **Application**: Translation of real-world structures into digital data formats, such as point cloud and vectorization of it. 3) **Perspectives**: Machine Learning, AI and of Data Management in the context of sustainability.
Admission	Master of Wood Technology, Specializations CTS and MPI
Competencies upon completion	At the end of the course students will: - Understand key principles of data and data management, such as data storage, organization, quality and security. - Learn intuitive tools to develop their own data management strategy (Airtable) - Be able, with the help of digital tools, interpret and visualize data - Get the ability to translate the reality to data by capturing the point cloud and transforming it in the usable data for planning in CAD software (3DWorkx) - Know the overview of challenges and emerging trends in this field, such as AI and LCA.
Composition	90 hours including: - 30 h Seminars/ Coaching - 60 h Self-study
Content	Spanning 8 weeks, the course is focused on the following topics: 1. Introduction: - Data definition, structure, modelling, and real-world examples. - Database significance and types. 2 Data Management: - Efficient storage, relational databases, and visualization techniques. - Potential challenges in database management. - Exercise with Airtable 3. Point Cloud & Digital Translation: - translating real structures to digital formats as a point cloud - Converting point clouds into intelligent data structures suitable for CAD software with 3DWorkx software - Exercise with 3DWorkx 4. Outlook: - Machine Learning & AI: Overview and practical applications in construction. - Data management in the context of sustainability and LCA
Teaching and Learning form	Lectures, exercises, coachings, discussions and practical experimentations

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Fundamentals in Data Management - MBW2110

Time frame	8 weeks in spring semester, 3 ECTS credits = 90 h
Contact lessons	30 Hours
Attendance requirement	Attendance mandatory - special permissioon for absence needed
Proof of competence	During the course, there are 2 graded tasks: - Creation of a database using Airtable, analyzing and visualizing it. - Vectorization of the 3D point cloud of a wooden bridge with 3DWorkx software. The final course grade is the average of these exercises. This course is part of "Digital Manufacturing MBW2111" for MPI students or "Timber Data Management MBW2121" for CTS students. In both cases, the course is worth 3 ECTS points.
Aids for written examination	Not relevant

Data Management for Timber Engineers - MBW2121

ECTS	2
Study language	English
Module type	Elective module
Lecturer(s)	Augustynowicz Edyta, Breitenmoser Pascal, Escoda Llorens Joaquim, Lehmann Martin, Maillard Denis, von Gunten Simon
Module responsibility	Prof. Dr.-Ing. Martin Lehmann Phone: +41 (0)32 344 03 21 E-Mail: martin.lehmann@bfh.ch Lecturers/tutors: Dr. Martin Lehmann, Pascal Breitenmoser and Armin Jud
Short description of the module	This Module is part of CTS Project 1. The following modules need to be taken as a group during the same semester: MBW2121.1 - Fundamentals in Datat Management MBW2122 - Case Study 1 - Modelling of Complex Structures MBW2123 - Freeform and Shell Structures
Admission	Admission to Master Wood Technology, Specialisation CTS
Entry requirements	Knowledge of the following software: RStab / RFEM / Rhino / Grashopper / Cadwork and various microsoft software
Presupposed modules	Completion of introduction to basics for RStab / RFEM / Rhino / Grashopper / Cadwork
Competencies upon completion	The students are in a position to estimate and understand the problematic of modelling complexe structures and to transfer data from one software to the other. Furthermore they are able: - to work in groups / interdisciplinary teams - to systematically approach a given task - to discuss / solve / present specific tasks - to apply learned skills in complex situations - to develop specific solutions regarding geometry, modelling, fabrication - to utilise / apply supporting software and tools - to systematically evaluate results and check for plausibility
Structure	18 h lectures 42 h self study / tutorial

Data Management for Timber Engineers - MBW2121

Content	Data interfaces in Cadwork Data transfer between Excel and RFEM Data tarnsfer between Cadwork and RFEM / Rstab Structure and programming of the interface between Grashoppers and RFEM
Teaching and learning form	- Lectures/Seminars - Tutorial/Workshops
Time frame	2 ECTS credits = 60
Literature	Relevant literature from libraries according to individual needs, software manuals
Attendance requirement	Full presence at lectures and seminars
Competency assessment	1 graded assignment
Assessment schedule	According to indication of lecturers
Aids for written examination	not relevant
Mode of repetition	not relevant
Follow-up modules	not relevant

CTS - Case Study 1 - MBW2122

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Augustynowicz Edyta, Escoda Llorens Joaquim, Maillard Denis, Tschümperlin Franz
Module responsibility	Edyta Augustynowicz Phone: + 41 774 17 38 35 E-Mail: edyta.augustynowicz@bfh.ch Lecturer(s): Augustynowicz Edyta, Denis Maillard, Franz Tschümperlin, Sylvain Usai, Dr. Kai Heinrich Strehlke
Short description of the module	The Case Study Module focuses on the comprehensive analysis and practical application of structural design principles using real-world projects. In this module, students are introduced to advanced structural concepts through the lens of a detailed case study, exemplified by the Cambridge Mosque Project. The module highlights the intersection of parametric design, structural analysis, and manufacturing processes, providing students with hands-on experience in managing complex architectural challenges. The module is part of the **CTS Project 1** and must be taken together with the following modules in the same semester: • **MBW2123 - Freeform and Shell Structures** • **MBW2122 - Case Study 1: Modelling of Complex Structures** • **MBW2121 - Data Management for Timber Engineers**
Admission	Admission to Master Wood Technology, Specialisation CTS
Entry requirements	Admission to Master Wood Technology, Specialisation CTS
Presupposed modules	Completion of introduction to basics for RStab / RFEM / Rhino / Grashopper / Cadwork The module is part of the **CTS Project 1** and must be taken together with the following modules in the same semester: • **MBW2123 - Freeform and Shell Structures** • **MBW2122 - Case Study 1: Modelling of Complex Structures** • **MBW2121 - Data Management for Timber Engineers**
Competencies upon completion	• Structural Design: Load-bearing analysis, static calculations with Grasshopper, Rhino, RFEM. • Parametric Modelling: Design optimized timber structures, precise 3D modeling. • Material & Fabrication: Timber analysis, CNC machine workflows. • Connections: Design and verify lap joints, screws, metal fittings. • Segmentation & Assembly: Plan for transport, efficient on-site assembly. • Digital Integration: Transfer models to CNC fabrication accurately. • Collaboration: Work in interdisciplinary teams, manage project workflows. • Problem-Solving: Address structural challenges with solution-oriented thinking. • Adaptability: Stay updated with new tech, learn through hands-on work..

CTS - Case Study 1 - MBW2122

Structure

1 x 45 min. per week Lectures/Seminar

4 x 45 min. per week Tutorial

Attendance mandatory - special permission for absence needed

Content

In the Case Study module, the structural design of the Cambridge Mosque is analyzed and constructively implemented. The focus is on modeling, calculating, and verifying complex load-bearing structures and details, with practical implementation. In interdisciplinary teamwork, designs are optimized for manufacturing and assembly using digital tools. Boundary conditions related to construction processes, planning, cost security, and Building Information Modelling (BIM) are also integrated into the workflow.

Contents

- Geometric and static development of freeform and shell structures, including parametric design using Grasshopper and Rhino.
- Static modeling and analysis through RFEM with detailed evaluation of internal forces (N, M, V) and load paths.
- Analysis of various influencing factors such as material properties, connection designs, and construction constraints on load-bearing behavior.
- Evaluation of efforts, including design verifications based on standards like SIA 265 and structural performance assessments.

Constructive implementation through CNC machine programming, segmentation for transport and assembly, and development of structural connections, with comprehensive presentation of results

Teaching and learning form

- Lectures/Seminars
- Tutorial/Workshops

Time frame

150 hours, where of

- 12h Lectures/Seminar

- 48h Tutorial

- 90h Independent Study, individual or in team

Literature

Relevant literature from libraries according to individual needs

Student Working Hours

5 ECTS credits = 150 h

Contact lessons

12h

Self-study

90h

Freeform and Shell Structures - MBW2123

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Augustynowicz Edyta, Barth Olivier Arnaud, Fricker Stephan, Lehmann Martin, Lindenberg Katharina, Maillard Denis, Tschümperlin Franz
Module responsibility	Edyta Augustynowicz Phone: + 41 774 17 38 35 E-Mail: edyta.augustynowicz@bfh.ch Lecturer(s): Augustynowicz Edyta, Denis Maillard, Dr.Diederik Veenendaal, Franz Tschümperlin, Dr. Stephan Fricker Sylvain Usai, Dr. Kai Heinrich Strehlke, Katharina Lindenberg
Short description of the module	The module **Freeform and Shell Structures** focuses on the analysis, design, and construction of complex timber load-bearing structures. The course is divided into three main parts, complemented by general introductory classes that provide students with additional context for the topic of complex timber structures: 1. **Geometric Development of Shell Structures** Students will explore the geometric design and development of freeform and shell structures, focusing on digital modeling and optimization techniques. 2. **Static Calculation and Analysis** This part covers static modeling, including the analysis of various influencing factors and boundary conditions on load-bearing behavior. Students will evaluate internal forces (N, M, V) and perform special design verifications for complex timber structures. 3. **Production and Fabrication** Students will learn to develop tools and workflows for programming CNC machines, enabling the digital fabrication of timber structures. This includes the use of 3D model exchange formats (Rhino-CADwork-Lignocam) and essential model checks for accuracy and feasibility. The course is led by industrial specialists, both national and international. As a part of the course, students will visit Blumer and Lehmann production facility.
Admission	Admission to Master Wood Technology, Specialisation CTS
Entry requirements	Admission to Master Wood Technology, Specialisation CTS
Presupposed modules	The module is part of the CTS Project 1 and must be taken together with the following modules in the same semester: • MBW2123 - Freeform and Shell Structures • MBW2122 - Case Study 1: Modelling of Complex Structures • MBW2121 - Data Management for Timber Engineers

Freeform and Shell Structures - MBW2123

Competencies upon completion

Upon completing the Freeform and Shell Structures ,MBW2123 module, students will:

- Understand the principles of load-bearing and static behavior of shell structures, considering various boundary conditions.
- Be familiar with shell theory and simplified structural models for complex timber structures.
- Be able to estimate and analyze the challenges of complex load-bearing structures.
- Recognize the geometries and structural laws governing freeform surfaces.
- Apply solution-oriented approaches to tackle the design, analysis, and fabrication of complex timber structures.
- Master digital tools such as Rhino/Grasshopper for geometric modeling, parametrization, and surface development.
- Utilize Dlubal RSTAB for static modeling and structural analysis, enabling them to identify and solve complex engineering problems.
- Understand the complexity of producing complex timber structures and learn to develop workflows for CNC machine programming to ensure precise and efficient fabrication.

Structure

3 x 45 min. per week Lectures/Seminar

2 x 45 min. per week Tutorial

Attendance mandatory - special permission for absence needed

Content

This course offers a comprehensive understanding of geometry, structural analysis, and production, equipping students with the skills to design, model, and fabricate complex timber structures through theoretical knowledge and hands-on practice.

The course focuses on the following main topics:

1. **Geometry and Digitalization:**

- Geometric and mathematical description as part of the form-finding process.
- State-of-the-art methods for geometric design, digitalization, and parametrization.
- Hands-on modeling of complex freeform and shell structures using advanced tools like Rhino/Grasshopper.

1. **Statics and Structural Analysis:**

- Fundamentals of shell and membrane theory, system typologies, load-bearing actions, and stability (local and global).
- Development of static models for timber shell structures, including connections and boundary conditions.
- Static calculation and design of primary structural components using software like Dlubal RSTAB.

1. **Production and Fabrication:**

- Modelling connections in Rhino, considering fabrication and erection requirements, tolerances, and load-deformation behavior.
- Development of workflows for CNC machine programming for the production of complex timber structures (Lignocam)
- Production on CNC machine different in complexity joints.

Additionally there will be general Introductory Topics:

- Introduction to the principles of complex timber structures, including load-carrying mechanisms, systematization of connections, and influencing factors.
- Insights from industry specialists, providing practical knowledge of design, modeling, and construction challenges in complex timber structures.

Freeform and Shell Structures - MBW2123

Teaching and learning form	- Lectures - Tutorials / workshops / solution-oriented assignments - Elaboration of solutions to various specific problems - Comparison of approaches and solutions
Time frame	150 hours, where of - 36h Lectures/Seminar - 60h Tutorial - 54h Independent Study
Literature	Relevant literature from library according to individual needs
Student Working Hours	150h
Contact lessons	36h
Self-study	54h y
Attendance requirement	Full presence at lectures and seminars / group work
Competency assessment	Intermediate and final presentation of the project, grading of submitted documentation
Assessment schedule	Written exams and / or marked individual / group assignments, according to indication of lecturers Intermediate and final presentation of the project, grading of submitted documentation
Aids for written examination	If exam, then open book
Mode of repetition	not relevant
Follow-up modules	not relevant

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Business Process Intelligence - MBW2131

ECTS	2
Study language	English
Module type	Elective module
Lecturer(s)	Jack Stefan, Standtke Ronny
Module responsibility	Standtke Ronny (str2) Phone: +41 32 344 03 33 E-Mail: ronny.standtke@bfh.ch
Short description of the module	In this module, students learn the basics of data science in order to be able to analyze and visualize data in a targeted manner. Building on this, various optimization methods and the basics of business process intelligence are taught.
Requirements	The following three modules need to be taken as a group during the same semester. MBW2131 Business Process Intelligence (2 ECTS) MBW2132 Case Study Process Design (5 ECTS) MBW2133 Humane Digitale Transformation (5 ECTS)
Presupposed modules	MBW3047 Business Process Management Warm-Up highly recommended.
Competencies upon completion	Students will be able to understand and competently apply principles of data science, optimization and business process intelligence: - basic data science methods - neural networks and machine learning - analysis and visualization of data - model and optimize business processes
Composition	24 h lectures, exercises and coaching 36 h Independent study
Content	The content of this module are the basic principles of data science, optimization and business process intelligence: - linear regression - k-nearest neighbors algorithm - perceptron - neural networks - matplotlib - optimization algorithms - different aspects of business process intelligence
Teaching and Learning form	- seminars / coaching - independent student work
Student Working Hours	2 ECTS = 60 hours

Business Process Intelligence - MBW2131

Contact lessons	Around 40%
Self-study	Around 60%
Attendance requirement	Attendance mandatory - special permission for absence needed
Proof of competence	written intermediate examination (90 min) written final examination (90 min)
Assessment proportion	50% intermediate examination 50% final examination
Assessment schedule	End of 1st quarter: intermediate examination Last lesson: final examination

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MPI - Case Study 1: Process Design - MBW2132

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Jack Stefan, Standtke Ronny
Module responsibility	Jack Stefan (jas2) Phone: +41 79 536 87 30 E-Mail: stefan.jack@bfh.ch
Short description of the module	In this case study the students learn the practical aspects of building and operating a business intelligence infrastructure. This includes the application of principles of agile project management, systems engineering and intuitive design. In addition to that we will discuss topics like analyzing, visualizing and evaluating business data in order to make data-driven decisions. This leads to optimized processes.
Requirements	Students are interested in systematic and structured methods that allow the treatment of interdisciplinary medium-complex projects. In addition to the technical aspects, we also focus on human-centered design. The following three modules need to be taken as a group during the same semester. MBW2131 Business Process Intelligence (2 ECTS) MBW2132 Case Study Process Design (5 ECTS) MBW2133 Humane Digitale Transformation (5 ECTS)
Presupposed modules	Business Process Management Warm-Up highly recommended.
Competencies upon completion	The students are able to: - Successfully setup a project with the principles of project management, requirements engineering and systems engineering - analyze, design, model, visualize, integrate, verify & validate processes - constantly manage all involved stakeholders - follow the principles & thinking of intuitive design - consolidate different business data sources - analyze and optimize processes based on the consolidated data - work in real industry projects
Composition	40 h Lectures and coaching 110 h Independent Study
Content	The overarching aim of this module is to apply the concepts and knowledge learned in the modules MBW2131 and MBW2133: - Agile project management - Systems Engineering - Intuitive Design - Data Science, Analysis and Visualization - Neural Networks, Machine Learning, AI - Big Data - Optimization processes - Basics of business process management

MPI - Case Study 1: Process Design - MBW2132

Teaching and Learning form	- Seminars / Coached sessions - Independent student work
Student Working Hours	5 ECTS = 150 hours
Contact lessons	Around 30% Additional input and the implementation of the project will be supported during coached sessions.
Self-study	Around 70%
Attendance requirement	Yes, during seminars and coached sessions Attendance mandatory - special permission for absence needed
Proof of competence	2 x presentation of the intermediate stand (per group) presentation and written report (per student)
Assessment proportion	75% Implementation of the project (Collective evaluation by the lecturer and peer-to-peer assessment for individualization) 25% Final presentation (Peer-grading)
Assessment schedule	Final lecture

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Humane Digital Transformation - MBW2133

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Jack Stefan, Standtke Ronny
Module responsibility	Jack Stefan (jas2) Phone: +41 79 536 87 30 E-Mail: stefan.jack@bfh.ch
Short description of the module	**Human digital transformation** is about making innovation and digitalization "human-compatible". That means we are looking at important topics like systems engineering with aspects as reliability & risk management, leadership & human factors, intuitive design meaning design principles & design thinking, human-centerd change management, rules for the systematic innovation (the Bernish Innovation Model) and a side view to the BFH "Digital Transformation Toolbox".
Requirements	Interest in systematic and structured methods that allow the treatment of interdisziplinary medium-complex projects adequately human-centered
Presupposed modules	Business Process Management Warm-Up highly recommended.
Competencies upon completion	• Having the system thinking internalised • Beeing able to practically apply the concepts of plant planing and smart factory • knowing how processes are designed by analysis, modelling, visualisation, integration, verification & validation • knowing how manage suppliers & customers in respect of project management and systems engineering • knowing the principles & thinking of intuitive design • knowing the important factors bringing human-centerd change management to a success • have a disruptive attitude built towards innovation and changed structure of organizations and business processes • Knowing how companies are systematically accompanied in digitization so that it is strategically and not solely technologically driven. Knowing concrete tools to respectively apply.

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Humane Digital Transformation - MBW2133

Content

Systems Engineering: system thinging & -architecture, link to plant planning (Anlagenplanung, BSc) & "Methodlogy Smart Factory" (BSc) , process design (process analysis, -modelling, -visualisation), integration, verification & validation, supplier & customer management, reliability & risk management, leadership & human factors

Intuitive Design: design principles & design thinking. Main focus:

- How can project managers specify in such a way that users of a system are guided to achieve their goal with high probability?
- Importance & application of user stories and use cases

Human-Centerd Change Management: Main focus:

- Technology Acceptance Model (TAM)
- When making changes, not only don't forget the human factor, but place it at the center.
- What are his needs and fears? How can they be met?
- Dealing with resistance

Rules for the systematic innovation: the Bernish Innovation Model
Management of disruptive innovation: disruptive attitude towards innovation and changed structure of organizations and business processes.

The BFH **" Digital Transformation Toolbox":**
From strategy-check and needs analysis to technical implementation:
How companies are systematically accompanied in digitization so that it is strategically and not solely technologically driven but also concrete tools are presented.

Teaching and Learning form

Contact lessons and exercises

Student Working Hours

150 hours (5 ECTS)

Attendance requirement

Your attendance is requirement because of regular teaching discussions, discussion of assignments and exam preparation.

Proof of competence

Written test in Moodle

Assessment proportion

100% witten test

Assessment schedule

at the end of the semester

Innovation Strategy - MBW2211

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Braun Aron, Letsch Bernhard
Module responsibility	Bernhard Letsch Phone: +41 (0)32 344 03 06 E-Mail: bernhard.letsch@bfh.ch Lecturers/tutors: Aron Braun, Christoph Hunziker, Cédric Höllmüller
Short description of the module	This Module is part of MPI Project 2. The following three modules need to be taken as a group during the same semester: MBW2211 - Innovation Strategy MBW2212 - Case Study 2 - Innovation Management MBW2213 - Finance & Legal
Requirements	Admission to Master Wood Technology, Specialisation MPI
Competencies upon completion	The students learn to - improve the innovative capacity of a company by implementing strategies, structures and cultures for innovation within an organisation - enable and lead teams to develop creative and innovative results
Composition	64 x 45 min. Lectures / Seminar Attendance mandatory- special permission for absence needed about 150 hours, where of: - 64 h Lecture / Seminar - 86 h Independent Study
Content	• Introduction to innovation management • Management of innovation in an organisation (strategy, structure, culture, process) • Group dynamics in a complex environment (leadership and team, coaching for innovation projects, change management) • Management of trends and ideas • Internal and external factors (innovation and organisation, open innovation) - Incremental and disruptive innovation • Management of innovation projects • Human-centered product development as a key requirement for successful product innovation. • Design thinking process and implementation design thinking in a practical context. • Transformation of a new value proposition into an economically viable business model • Innovation Talk with Innovators in the Wood Industry
Teaching and Learning form	• Lectures / Seminars • Tutorial / Coaching
Literature	to be determined

Innovation Strategy - MBW2211

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Braun Aron, Letsch Bernhard, Winterberg Norbert
Module responsibility	Bernhard Letsch Phone: +41 (0)32 344 03 06 E-Mail: bernhard.letsch@bfh.ch Lecturers/tutors: Aron Braun, Christoph Hunziker, Cédric Höllmüller
Short description of the module	This Module is part of MPI Project 2. The following three modules need to be taken as a group during the same semester: MBW2211 - Innovation Strategy MBW2212 - Case Study 2 - Innovation Management MBW2213 - Finance & Legal
Entry requirements	Admission to Master Wood Technology, Specialisation MPI
Competencies upon completion	The students learn to - improve the innovative capacity of a company by implementing strategies, structures and cultures for innovation within an organisation - enable and lead teams to develop creative and innovative results
Structure	64 x 45 min. Lectures / Seminar Attendance mandatory- special permission for absence needed about 150 hours, where of: - 64 h Lecture / Seminar - 86 h Independent Study
Content	• Introduction to innovation management • Management of innovation in an organisation (strategy, structure, culture, process) • Group dynamics in a complex environment (leadership and team, coaching for innovation projects, change management) • Management of trends and ideas • Internal and external factors (innovation and organisation, open innovation) - Incremental and disruptive innovation • Management of innovation projects • Human-centered product development as a key requirement for successful product innovation. • Design thinking process and implementation design thinking in a practical context. • Transformation of a new value proposition into an economically viable business model • Innovation Talk with Innovators in the Wood Industry
Teaching and learning form	• Lectures / Seminars • Tutorial / Coaching
Literature	to be determined

Innovation Strategy - MBW2211

Student Working Hours	5 ECTS credits = 150 h
Weighting	50% Written Exam, 90 min. 50% Writing a logbook for the design thinking process parallel to the case study (MBW 2212)

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MPI - Case Study 2 - MBW2212

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Braun Aron, Letsch Bernhard, Rascón Alberto
Module responsibility	Bernhard Letsch Phone: +41 (0)32 344 03 06 E-Mail: bernhard.letsch@bfh.ch Lecturers/tutors: Aron Braun, Alberto Rascon, Christoph Hunziker
Short description of the module	This Module is part of MPI Project 2. The following three modules need to be taken as a group during the same semester: MBW2211 - Innovation Strategy MBW2212 - Case Study 2 - Innovation Management MBW2213 - Finance & Legal
Requirements	Admission to Master Wood Technology, Specialisation MPI
Competencies upon completion	The students learn to implement the contents and methods of the modules Design Thinking and Innovation Strategy (MBW2211) by means of a practical assignment. They are able to convince project sponsors, superiors or potential investors of their business idea.
Composition	64 x 45 min. Tutorial / Coaching Attendance mandatory - special permission for absence needed about 150 hours, where of - 64 h Tutorial / Coaching - 86 h Independant Study, individual or as teams
Content	- Elaboration of a business idea with a business plan - Pitch / presentation of the business idea in front of potential investors
Teaching and Learning form	- Lecture / seminar - Coaching
Student Working Hours	5 ECTS credits = 150 h
Assessment proportion	100% Group assignment (incl. business plan, presentation)

Finance and Legal - MBW2213

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Letsch Bernhard, Rascón Alberto
Module responsibility	Bernhard Letsch Phone: +41 (0)32 344 03 06 E-Mail: bernhard.letsch@bfh.ch Lecturers/tutors: Alberto Rascon, Paul Peyrot
Short description of the module	This Module is part of MPI Project 2. The following three modules need to be taken as a group during the same semester: MBW2211 - Innovation Strategy MBW2212 - Case Study 2 - Innovation Management MBW2213 - Finance & Legal
Requirements	Admission to Master Wood Technology, Specialisation MPI
Competencies upon completion	The students learn to lead innovation projects and start ups considering legal and financial factors.
Composition	64 x 45 min. Lectures / Seminar Attendance mandatory - special permission for absence needed about 150 hours, where of - 48 h lecture / seminar - 100 h independent study
Content	- Financial management - International accounting standards - Foundation of a company - Managing investors - Requirements of investors and governors (e.g. liabilities) - Intellectual property and contracts - Mergers & acquisition, due dilligence - Risk management
Teaching and Learning form	- Lectures / Seminars - Tutorial / Coaching
Literature	Pratt, J. (2013), Financial Accounting in an Economic Context (9th edition), John Wiley & Sons. Brealey Richard, Myers Stewart Allen Franklin, Principles of Corporate Finance (February 28, 2019) 13th Edition McGraw-Hill Education;
Student Working Hours	5 ECTS credits = 150 h

Finance and Legal - MBW2213

Assessment proportion

100% written exam, 90 min.

Resources during the exam: Open Book

Assessment and Retrofitting - MBW2221

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Fuhrmann Christoph
Module responsibility	Prof. Christoph Fuhrmann Lecturers/tutors: Prof. Christoph Fuhrmann, Dr. René Steiger, Beat Lauber, Prof. Martin Geiser, Pierino Lestuzzi, others
Short description of the module	This Module is part of CTS Project 2. The following three modules need to be taken as a group during the same semester: MBW2221 - Assessment and Retrofitting MBW2222 - Case Study 2 - Multi-Story Timber and Hybrid Structures MBW2223 - Earthquake and Design
Entry requirements	Admission to Master Wood Technology, Specialisation CTS
Competencies upon completion	The students will learn to ...
Structure	56 x 45 min. Lectures / Seminar 8 x 45 min. Tutorial Attendance mandatory - special permission for absence needed 150 hours, whereof: - 42h Lectures / Seminar (56 lectures) - 6h Tutorial with assignments - 102h Independent Study

Assessment and Retrofitting - MBW2221

Content

Contents (summary)
Switzerland is built-up! Due to the scarcity of resources, it is in the public interest to preserve and (re)use built stock. Status report, the correct assessment of the (remaining) useful or service life and the legally secured operation of the building all play a significant role.

Contents
Methods of status detection (12 lectures + 8 tutorials, A. Müller)
- Regulations, methods for status report, NDE and tests to verify structural condition, condition assessment, recognise damage, updating material properties and bearing resistances

Structural analysis / load bearing structure and evidence/ verifications (12 lectures, R. Steiger, B. Lauber)
- Updating of impacts, geometrical quantities, creating and verifying of structural models, modelling of bearing structures and joints, overall stability, deterministic evidence, probabilistic evidence

Repairing and reinforcing (16 lectures, B. Lauber)
- Immediate measures and safety measures, identify and eliminate cause of damage, possibilities of reinforcing components and connections, modelling - calculating - implementing of reinforcement measures, remaining useful/service life, monitoring

Earthquake safety in buildings (16 lectures, M. Geiser)
- Reviewing and strengthening with respect to earthquakes
- Deformation-based structural analysis
- Performance level, remaining service life, proportionality, reasonableness
- Norm SIA 269/8 (should be published by 2018!)

Teaching and learning form

- Lectures
- Tutorial

Literature

To be determined

Student Working Hours

5 ECTS credits = 150 h

Contact lessons

64 contact lessons, including laboratory work

Weighting

100% written exam, 120 min.

Resources during the exam: Open book

CTS - Case Study 2 - MBW2222

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Augustynowicz Edyta, Fuhrmann Christoph, Geiser Martin, Geyer Christoph, Kramer Lukas, Müller Andreas, Penrroz Matias, Renfer Christoph, Rohner Thomas, Sigrist Christophe
Module responsibility	Prof. Christoph Fuhrmann Lecturers/tutors: Prof. Christoph Fuhrmann, Prof. Martin Geiser, others
Short description of the module	This Module is part of CTS Project 2. The following three modules need to be taken as a group during the same semester: MBW2221 - Assessment and Retrofitting MBW2222 - Case Study 2 - Multi-Story Timber and Hybrid Structures MBW2223 - Earthquake and Design
Entry requirements	Admission to Master Wood Technology, Specialisation CTS
Competencies upon completion	In the case study, students will apply the knowledge acquired in the modules MBW2101, MBW2221 and MBW2223 to an individual architectural design in interaction with the JMA and will learn the interconnected handling of a design task.
Structure	2 sessions of 4 x 45 min. Lectures/Seminar with assignments (building physics) 7 sessions of 4 x 45 min. & 4 sessions of 8 x 45 min. Coaching Attendance mandatory - special permission for absence needed 150 hours, where of: - 6h lectures/seminar with assignments (= 8 class periods) - 45h coaching - 99h independent study, individual or in team
Content	Starting point is the architectural design of a building as 3D model. It concerns the interdisciplinary development of a structural design together with architecture students. In the framework of the case study, the following task should be solved: - Create an aseismic structural design, taking into account the requirements of the building geometry and building stabilization (wood and hybrid solutions) - Apply the substitute force method and the response spectrum analysis (RSA) to a 3D structural model (numerical simulation, plausibility probe and sensitivity analyses) - Integration of building technology - Holistic assessment incl. building physics, fire protection concept and costs
Teaching and learning form	- Lectures / Seminar - Coaching

CTS - Case Study 2 - MBW2222

Time frame	- Bachmann (2002): Erdbebengerechter Entwurf von Hochbauten. (see page BAFU) (Aseismic design of multi-storey structures) - Kolb, J. (2008): Systems in Timber Engineering, Loadbearing Structures and Component Layers. Hrsg. v. Lignum - Holzwirtschaft Schweiz / DGfH - German Society of Wood Research. ISBN 978-3-7643-8690-0
Student Working Hours	5 ECTS credits = 150 h
Weighting	100% Presentations and technical reports

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Earthquake and Design - MBW2223

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Gafner Bernhard, Geiser Martin, Hess Mario, Lang Kerstin, Lestuzzi Pierino, Müller Andreas, Renfer Christoph, Steiger René
Module responsibility	Prof. Martin Geiser Phone: +41 (0)32 344 03 63 E-Mail: martin.geiser@bfh.ch Lecturers/tutors: Prof. Martin Geiser, Dr. Pierino Lestuzzi, Dr. René Steiger, Dr. Andrea Bernasconi, Dr. Cornelius Oesterlee, Mario Hess
Short description of the module	This Module is part of CTS Project 2. The following three modules need to be taken as a group during the same semester: MBW2221 - Assessment and Retrofitting MBW2222 - Case Study 2 - Multi-Story Timber and Hybrid Structures MBW2223 - Earthquake and Design
Requirements	Admission to Master Wood Technology, Specialisation CTS
Competencies upon completion	Graduates of the course will be able to develop structural concepts for multi-storey timber buildings and hybrid buildings. They will understand the load-bearing behaviour under seismic conditions; they will know the relevant standards, regulations and calculation methods. Furthermore they will have the ability to critically assess both earthquake calculations and their results and to draw proper conclusions therefrom.
Composition	64 x 45 min. lectures / seminar Attendance mandatory - special permission for absence needed 150 hours, including - 48h lectures / seminar (64 lectures) - 28h tutorial - 74h independent study

Earthquake and Design - MBW2223

Content

Contents (summary)
Regardless of the construction material, seismic safety must be guaranteed. Earthquake-resistant construction is inevitable from a technical, normative and legal perspective. An seismic design and an effective concept for bracing are essential for a good structural behaviour. With the help of special programs, the substitute force method or the response spectrum analysis will be used to determine the cutting powers.

Contents
- Structural/load-bearing designs for multi-storey timber buildings
- Fire safety concepts for multi-storey timber buildings (evacuation, smoke extraction, etc.)
- Structural dynamics, seismology, normative, legal und design basics
- Structural standards, eccentricity and torsion
- Capacity design and behaviour coefficient
- Rigidity, relevance of material properties and structural design
- Robustness, constructive measures, equivalent member method, lateral force method, response spectrum analysis (RSA)
- Modelling 2D and 3D, computer calculation
- Hybrid structures
- Findings from research projects, practical examples
- Sensitivity analysis

Teaching and Learning form

- Lectures / Seminar
- Tutorial

Literature

Bachmann, Hugo, Seismic Conceptual Design of Buildings - Basic principles for engineers, architects, building owners, and authorities, BWG, Biel 2003

Student Working Hours

5 ECTS credits = 150 h

Assessment proportion

100% Written exam, 120 min

Resources during the exam: Open book

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Modification of Wood and Fibers - MBW2311

ECTS	5
Study language	English
Module type	Elective module
Lecturer(s)	Volkmer Thomas
Module responsibility	Dr. Thomas Volkmer Tel. +41 32 344 0346 email: thomas.volkmer@bfh.ch
Short description of the module	Wood and bio-based fiber materials are characterized by numerous properties, what make them favorable for many different applications in the construction industry, furniture application, packaging and pulp and paper industry. Beside the significant advantages wood and fibers have also some draw backs like biodegradability, burnability and light instability. With different possibilities of wood modification, it becomes possible to adapt these parameters in order to increase and extend the possible applications of wood. In this course the students will get to know more about the critical properties of wood and fiber material and also the different procedures to modify them. Beside the technical aspects they will learn also the ecological and economical facts about wood and fiber modification.
Admission	Admission to Master Wood Technology, Specalisation
Requirements	Basic knowledge in wood anatomy, wood physics and wood chemistry from the preparatory course Wood Science
Competencies upon completion	After the course the participants will know the complex interactions between the chemical composition and physical properties of wood and fiber materials on the one side and on the other side they know the different approaches of modification and their consequences on the properties. They will have an overview about the ecological impact of the different procedures and the cost of the different methods.
Composition	40h lectures/seminar 24h guided laboratory work 86h group work, self study
Content	relevant chemical and physical properties of wood with respect to the application properties general aspects about wood protection, biodegradation, weathering of wood, flammability, fire resistance modification procedures: technical processes, ecological impacts, costs evaluations tests of the efficiency of the modification procedure
Teaching and Learning form	Lectures/seminar Laboratory work in small groups Self study
Literature	Hill Callum (2006), Wood modification: Chemical, Thermal and Other Processes, John Wiley&Sons, Ltd
Student Working Hours	150h

Modification of Wood and Fibers - MBW2311

Contact lessons	64 contact lessons, including laboratory work
Self-study	The self-study will include the following elements: - Preparation and follow-up of the lectures - Independent in-depth study of content and additional literature - Group work, preparation of presentations - Exam preparation
Attendance requirement	Attendance of all lessons including presentations is compulsory. Exceptions must be approved in advance by the person responsible for the module.
Proof of competence	The final grade consists of two parts: - Presentation of Lab Project including a written report (50%) - Written Exam, 60 Minutes (50%)
Assessment schedule	Dates will be announced in the starting lecture of the module.

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Case Study Prototyping of Sustainable Products - MBW2312

ECTS	5
Study language	English
Module type	Elective module
Module responsibility	Prof. Dr. Ingo Mayer Tel. +41 32 344 03 43 Email: ingo.mayer@bfh.ch
Short description of the module	This Module is part of BBM Project 1. The following three modules need to be taken as a group during the same semester: MBW2311 - Modification of Wood and Fibers MBW2312 - Case Study Prototyping of Sustainable Products MBW2313 - Production and Recycling Technologies
Requirements	Admission to Master Wood Technology, Specialization BBM.
Competencies upon completion	The students are in a position to estimate and understand the problematic of product development and prototyping of bio-base products. Furthermore they are able: - to work in groups / interdisciplinary teams - to systematically approach a given task - to discuss / solve / present specific tasks - to apply learned skills in complex situations - to develop specific solutions regarding material preformance criteria, production technologies and raw material components - to utilise / apply production techniques at lab scale - to systematically evaluate results and develop follow-up stratgies for further improvement of the prototype
Content	The case study includes the development of a new composite material using a biopolymer in cooperation with a business partner. This includes - Creation of a material concept according to the specifications of the partner company - Selection of the basic components - Evaluation of the material matrix - Definition and validation of production technology - Prototyping and production of material samples at lab scale - Determination of material properties - Final technical and economic process balancing - Communication of the results to the partner company
Attendance requirement	Full presence at lectures and seminars / group work
Proof of competence	Intermediate and final presentation of the project, grading of submitted documentation
Assessment schedule	According to indication of lecturers

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Production and Recycling Technologies - MBW2313

ECTS	5
Study language	English
Module type	Elective module
Module responsibility	Prof. Dr. Ingo Mayer Tel. +41 32 344 03 43 Email: ingo.mayer@bfh.ch
Short description of the module	This Module is part of BBM Project 1. The following three modules need to be taken as a group during the same semester: MBW2311 - Modification of Wood and Fibers MBW2312 - Case Study Prototyping of Sustainable Products MBW2313 - Production and Recycling Technologies
Requirements	Admission to Master Wood Technology, Specialization BBM.
Composition	64 x 45 min. Tutorial / Coaching Attendance mandatory - special permission for absence needed about 150 hours, where of - 66 h Tutorial/Coaching - 86 h Independant Study, individual or as teams
Content	• Manufacturing processes (conditioning, cutting, pressing, joining, additive processes, bonding, foaming, drying and others) with further information on available scales, process costs and energy and ressource consumption • Recycling processes and material cycles • Process balancing (material, energy, further resources)
Teaching and Learning form	• Lecture / seminar • Coaching
Student Working Hours	5 ECTS credits = 150 h
Proof of competence	50%: Presentation and written report about a specific production process 50%: Written exam at the end of the semester (60 min)

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Wood-Based Panels 1 - MBW3031

ECTS	2
Study language	English
Module type	Optional module (countable)
Module responsibility	Heiko Thoemen Phone: +41 (0)32 344 03 31 E-Mail: heiko.thoemen@bfh.ch
Competencies upon completion	The students acquire expert knowledge on the production of wood-based panels, as well as on their properties and uses. A special focus lies on the process technology of MDF/HDF, OSB and particleboard. Further topics are international markets for wood-based panels, raw material and production costs, process control as well as current innovations in the field.
Composition	1 week, 30 lectures hours: - 40h Lectures - 20 h preparation for exam
Content	- Structures and properties of wood - Markets and uses, raw materials - Particle generation and screening, drying - Adhesive application - Mat formation, pre-heating and pressing - Computer-based simulation of hot pressing process - Standards and Testing - Sensors and process control - Field trip - Production process reports
Teaching and Learning form	- Lectures - Excursion
Literature	H. Thoemen et al. (eds.) (2010) Wood-Based Panels - An Introduction for Specialists. Brunel Univ. Press, 283 p. Free download: www.ahb.bfh.ch/ahb/de/Schule/Publikationen/Publikationen)
Assessment proportion	Attendance required, presentation at the end of the module, pass/fail

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Wood-Based Panels 2 - MBW3032

ECTS	2
Study language	English
Module type	Optional module (countable)
Module responsibility	Ingo Mayer Phone: +41 (0)32 344 03 43 E-Mail: ingo.mayer@bfh.ch
Short description of the module	The module is a module of the CAS Wood-Based Panels programme focusing on the relationship between adhesive systems, process parameters and material emissions. This course is organized in a hybrid format: While the full programme is offered on-site in Biel, Switzerland, selected presentations and seminars will be streamed, allowing participants to attend from anywhere in the world. The course: - is aimed at researchers, managers and experts in the wood-based panels industry, associated industries, material technology, engineers from processing companies, and distributors; - teaches you about the latest technologies for decreasing formaldehyde and VOC emissions of wood-based panels with an special focus on formaldehyde-free and bio-based alternative adhesives; - gives you the opportunity to build a network course participants and specialists from all over the world; - provides room for discussing your individual technological challenges; - gives you the opportunity to benefit from the extensive knowledge of renowned experts; - helps you find solutions to real-life problems in everyday business.
Competencies upon completion	You will have theoretical and practical knowledge of the interaction between adhesives and emissions with an special focus on formaldehyde-free and bio-based alternative adhesives. You gain an overview of the interactions between raw wood material, adhesives, production processes, carrier panel properties and the resulting material emissions. You got introduced to the latest technologies for reducing or replacing formaldehyde and minimising VOC emissions. You will also have built a wide network of experts and specialists in the field.
Composition	week, 30 lectures hours: - 30 h Lectures - 20 h preparation for exam
Content	• Ifluence of process parameters on VOC emissions • Influence of process parameters on Formaldehyde emissions • Emissions of wood-based panels and constructions • Planning and ensuring indoor air quality • Emissions testing / virtual lab stage • Bio-based adhesives • Adhesives and LCA of wood-based panels • 5-HMF as formaldehyde replacement • Starch-based adhesives • Tannin-based adhesives • Lignin-based adhesives • Adhesive testing/virtual lab stage • Bio-based adhesives and process implementation
Teaching and Learning form	- Lectures - Group Work - Workshop
Proof of competence	Attendance required, presentation at the end of the module, pass/fail

BIM - Building Information Modelling - MBW3035

ECTS	3
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Emmenegger Manuel, Lindenberg Katharina, Nyffeler Anne, Trümpler Louis
Module responsibility	Katharina Lindenberg Expert Lectureres: Anne Nyfeller (Pirmin Jung, SysTEAMatik), Manuel Emmenegger (opensource.construction, bim.do)
Short description of the module	Building Information Modeling (BIM) has been promoted for over two decades as a transformative digital planning method, promising improved design quality, streamlined construction processes, and enhanced sustainability. However, in practice, these promises have often remained unfulfilled. BIM is still frequently treated as an add-on rather than an integrated workflow, with limited value gained relative to the additional effort required. Its adoption is hindered by outdated planning routines, fragmented processes, and a lack of strategic implementation. This course takes a critical, goal-oriented approach to BIM in timber construction. Participants will not only gain foundational knowledge but also learn to operate relevant tools and understand the methodologies behind BIM. The aim is to equip engineers with the ability to assess BIM's real-world impact, navigate its limitations, and apply it effectively in timber construction projects.
Admission	Admission to Master Wood Technology
Competencies upon completion	**Learnings** In this module you will learn how to navigate 3D models and Information from the perspectives of a Designer, Engineer and BIM Coordinator, and learn to make informed decisions about how and what to model for respective tasks. After this course you will: • Understand the fundamentals of BIM and its relevance to timber construction. • Set up and use standard CAD software for BIM modeling. • Work with native data formats and IFC for digital collaboration and interoperability. • Identify and integrate key requirements for timber construction and structural design. • Interpret structural analysis results within a digital workflow. • Apply BIM methodologies to real-world timber construction projects. • Collaborate effectively in teams using digital tools. • Present BIM-based project outcomes in a professional context.

BIM - Building Information Modelling - MBW3035

Teaching and learning form

Lectures / Seminar/ Excersises
Independent Study
Interoperability Group Work

Literature

Software used during the course | *Licences will be provided*

- Archicad, ggf. CADwork (CAD Environment)
- Rhino/GH (Parametric Modelling, geometry generation)
- Speckle (Model viewer and Collab)
- buildagil (Common Data Environment and Collab)
- *and many more :)*

Student Working Hours

3 ECTS credits = 90 h

Contact lessons

40 hours

Attendance requirement

80% of contact hours

Competency assessment

50% Moodle: **Learning Log** (min. 1 Page of insights per week following a coherent scheme) *Individual*

20% Buildagil: completeness of **exercises** during the course *Individual*

20% Miro/Buildagil: **Use Case evaluation** based on the BIMwood T-Model *Group work*

10% Final Colloquium: **Presentation of Use-Case** and possible Workflows *Group work*

Assessment schedule

Mandatory Attendance at the Final Review of the course

Weekly deliverables according to Moodle

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RFM/RSTAB Basics - MBW3036

ECTS	1
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Lehmann Martin
Module responsibility	Dr.-Ing. Martin Lehmann Phone: +41 (0)32 344 03 21 E-Mail: martin.lehmann@bfh.ch
Short description of the module	The students are able to model simple timber structures using RSTAB / RFEM and know how to check the plausibility of a model. The students know how to simplify models and understand the influence of the simplification on the results. The students understand the difference between model and real structure.
Requirements	Admission to Master Wood Technology, Specialization CTS
Competencies upon completion	The students are able to model complex timber structures using RSTAB / RFEM and know how to check the plausibility of such models.
Content	• RFEM / RSTAB • Introduction • How to create a simple model • Plausibility check of a model • How to interpret the results
Teaching and Learning form	• Lectures / seminars • Tutorials
Literature	• Manuals • Programme tutorials
Student Working Hours Contact	30 h
lessons	12 contact lessons
Self-study	at least 20 h
Attendance requirement	Attendance of all contact lessons is compulsory. Exceptions must be approved in advance by the person responsible for the module.

RFM/RSTAB Basics - MBW3036

Assessment proportion	one assignment will be graded
Assessment schedule	the task for the assignment will be distributed around mid semester.
Mode of repetition	The assignment can be improved once and this is counted as a second attempt, in case the improved assignment cannot be graded as sufficient, a new assignment must be completed as the last attempt.
Continuative, in depth modules	RFEM/RSATB Advanced
Costs	-
Comment	Resources for the lectures: Laptop (min.16 GB RAM recommended) with the following programs installed: • RFEM version 5-32-02 • RSTAB version 8-32-02
Weblink(s)	https://www.dlubal.com/en/education/students-and-schools/free-structural-analysis-software-for-students https://www.dlubal.com/en/downloads-and-information/free-trial-versions/download-trial-versions

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RFM/RSTAB Advanced - MBW3037

ECTS	1
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Lehmann Martin
Module responsibility	Dr.-Ing. Martin Lehmann Phone: +41 (0)32 344 03 21 E-Mail: martin.lehmann@bfh.ch
Short description of the module	
Requirements	RFEM/RSTAB Basics or equal qualification
Competencies upon completion	The students are able to model complex timber structures and knoe how to check the plasibility of those models
Proof of competence	A assignment will be graded
Weblink(s)	https://www.dlubal.com/en/education/students-and-schools/free-structural-analysis-software-for-students

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Math CAD - MBW3038

ECTS	1
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Lehmann Martin
Module responsibility	Martin Lehmann Phone: +41 (0)32 344 03 21 E-Mail: martin.lehmann@bfh.ch
Short description of the module	The aim of this module is that the students learn how to use the program Mathcad Prime.
Requirements	Admission to Master Wood Technology, Specialization CTS
Competencies upon completion	The students know how to use Mathcad for timber engineering tasks
Content	how to use Mathcad
Teaching and Learning form	• Lectures / seminars • Tutorials
Literature	• Manuals • Programme tutorials
Student Working Hours	30 h
Contact lessons	10
Self-study	at least 22 h
Attendance requirement	Attendance of all contact lessons is compulsory. Exceptions must be approved in advance by the person responsible for the module
Proof of competence	One assignment will be graded.
Assessment schedule	The task for the assignment will be distributed around mid semester.
Mode of repetition	The assignment can be improved once and this is counted as a second attempt, in case the improved assignment cannot be graded as sufficient, a new assignment must be completed as the last attempt.

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Math CAD - MBW3038

Comment	Resources for the lectures: Laptop with Mathcad Prime 9 installed:
Weblink(s)	https://www.mathcad.com/en/try-and-buy/mathcad-express-free-download

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Rhino and Grasshopper - MBW3039

ECTS	1
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Lindenberg Katharina, Thömen Heiko
Module responsibility	Katharina Lindenberg Phone: +41 (0)34 426 41 14 E-Mail: katharina.lindenberg@bfh.ch
Short description of the module	Offerd in autum semester 2020/2021
Admission	Admission to Master Wood Technology , Specialization CTS
Student Working Hours	1 ECTS credits = 30 h
Contact lessons	12 contact lessons
Attendance requirement	Attendance of all contact lessons is compulsory. Exceptions must be approved in advance by the person responsible for the module.

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Business Process Inteligence Warm-Up - MBW3047

ECTS	5
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Jack Stefan, Standtke Ronny
Module responsibility	Standtke Ronny (str2) Phone: +41 32 344 03 33 E-Mail: ronny.standtke@bfh.ch
Short description of the module	In this module, students learn the necessary basics for attending the subsequent three modules: MBW2131 Business Process Intelligence (2 ECTS) MBW2132 Case Study Process Design (5 ECTS) MBW2133 Human Digital Transformation (5 ECTS) On the one hand, this includes fundamental technical topics such as data formats, databases, interfaces, programming with Python, modeling with UML, test-driven development and first insights into business process modeling. On the other hand, we also go into more systematic basics such as requirement engineering and different types of project management in this module.
Requirements	Students should have a basic interest and understanding of technical and organizational contexts. As this is a module in preparation for other courses, no other modules are required.
Competencies upon completion	Students will be able to understand and competently apply the technical fundamentals required to attend subsequent courses, in particular: - the construction of and access to basic data formats - work with relational databases - create simple computer programs with Python - model systems with UML - design and implement tests for programs - model business processes with BPMN Students also learn systematic basics such as: - requirements engineering - different types of project management.
Composition	36 h lectures, exercises and coaching 54 h Independent study
Content	The content of this module are the following necessary basics for attending subsequent courses: - data formats - databases - interfaces - programming with Python - modeling with UML - test-driven development - business process modeling - requirement engineering - project management

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Business Process Inteligence Warm-Up - MBW3047

Teaching and Learning form	- seminars / coaching - independent student work
Student Working Hours	3 ECTS = 90 hours
Contact lessons	Around 40%
Self-study	Around 60%
Attendance requirement	Attendance mandatory - special permission for absence needed
Proof of competence	written intermediate examination (90 min) written final examination (90 min)
Assessment proportion	50% intermediate examination 50% final examination
Assessment schedule	End of 1st quarter: intermediate examination Last lesson: final examination

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LCA of Construction Products - MBW3050

ECTS	3
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Chabrelie Aude, Youssef Ahmad
Module responsibility	Prof. Dr. Aude Chabrelie Tel. 031 848 63 43 Email: aude.chabrelie@bfh.ch
Short description of the module	You put the LCA (Life Cycle Assessment) theory into practice, applied to a defined construction product. For this you learn and follow the specifications for Environmental Product Declarations. All LCAs conducted in this module serve as database for research.
Admission	Admittance to MWT.
Entry requirements	Product development, Basics of sustainability, Basics of Life Cycle Assessment, Wood and plants materials science (for MPI), wood construction and engineering (for CTS).
Presupposed modules	Course «Environmental Management» in Module MBW1232 "Scientific Method" or simultaneously
Competencies upon completion	Competencies upon completion / Professional competencies: The participants are able to conduct an LCA using a dedicated LCA software for LCA practitioners. They know the specific rules for conducting LCA of construction products. They are able to critically analyze the results of LCAs. Methodological skills: - Assessment of the environmental impacts of construction products in accordance with standard EN 15804 - Proficiency in life cycle analysis software and databases - Performance of sensitivity analyses on LCA results
Content	- Principle and methodology of LCA - Operation of the LCA software and related databases - Calculation of the environmental impacts of construction products - Methods for the assessment of the degree of confidence in the LCA's results
Teaching and learning form	- Interactive lectures - Own work on case study (self study) - Coaching on case study and inverted classroom - Presentation and reporting (logbook, factsheet and review) of the results
Time frame	6.10.25 -# 16.1.26
Literature	Book "Life cycle assessment (LCA) : a guide to best practice" from Klöpffer, Walter; Grahl, Birgit (2014) https://swisscovery.bfh.ch/permalink/41SLSP_BFH/af9luq/alma99116769588505513

LCA of Construction Products - MBW3050

Student Working Hours	75h â## 90h work
Contact lessons	15h contact hours
Self-study	Self-study: 60h -# 75h homework and graded assignments The self-study will include the following elements: - Preparation and follow-up of the lectures - Independent in-depth study of content and additional literature - Individual work on case study, preparation presentation and reporting (logbook, factsheet and review)
Attendance requirement	Attendance of all lessons including presentations is compulsory. Exceptions must be approved in advance by the person responsible for the module.
Competency assessment	Reporting and presentation of an LCA of a given construction product: - openLCA modelling file - Logbook - Presentation PPT - Factsheet - Review report of the LCA from a peer student

Excursion - MBW6001

ECTS	2
Study language	English
Module type	Optional module (countable)
Lecturer(s)	Thömen Heiko
Module responsibility	Heiko Thoemen Phone: +41 (0)32 344 03 31 E-Mail: heiko.thoemen@bfh.ch
Entry requirements	Admission to Master Wood Technology
Competencies upon completion	Students have experienced eight to ten different enterprises in the wood and building industry in one or several European countries. They have learned about individual companies in the wood sector and are exposed to different types of enterprises, business models, manufacturing types and products in an international context.
Structure	- 5 day excursion - Preparation of a short paper, possibly with presentation
Content	- Joined excursion of MWT students from Rosenheim and Biel - Experiencing and studying enterprises in the wood industry in Europe
Teaching and learning form	Touring of companies in the wood industry, independent research of one enterprise or other related topics per team, written report and presentation
Literature	To be determined depending on companies to be visited
Student Working Hours	60 h
Competency assessment	Pass or fail
Weighting	Participation, report, possibly presentation
Costs	Estimated costs, depending on target region: - 400 - 600 CHF for Central Europe - To be defined for other regions

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Master Thesis - MBW9001

ECTS	30
Study language	german/french/english
Module type	Elective module
Lecturer(s)	Fuhrmann Christoph, Garcia Vogel Andres, Gehri Nicola, Law Ian, Mayer Ingo, Starovicova Barbora, Thömen Heiko, Volkmer Thomas, Wick Adrian Willi
Module responsibility	Ingo Mayer Responsible for individual Master theses: Advisor, possibly additional supervisor
Short description of the module	The Master thesis creates the opportunity to specialize according to one's own interests. It deals with a practical topic or is part of a BFH research project. This project can mark the entry into the professional world or serve as a starting point for a career in academic research.
Presupposed modules	The topic for the Master thesis can be communicated at the earliest when the student has achieved at least 30 credit points in the Master Wood Technology Program.
Competencies upon completion	The students are capable of dealing independently and in a methodical manner with an assignment in the field of wood technology or timber construction and its application in neighbouring disciplines on a scientific basis. They thus demonstrate their ability to systematically represent and document their findings. The topic should cover a broad scope and correspond to the level of the Master degree course. Students should demonstrate that they are capable within this frame to prioritize and independently develop, assess and effectively implement solution strategies at this level.
Content	The module includes: - Master thesis - Colloquium (presentation and discussion)
Teaching and learning form	The students will define the thesis topic and methodology, conduct a literature review and/or experimental work, evaluate and interprete the findings, and will write the Master thesis. All work will be done on a high level of independency, but in close collaboration with the supervisor.
Student Working Hours	900 h
Contact lessons	none
Weighting	Assessment of the written thesis (67% of assessment) Assessment of the colloquium (33% of assessment) - 30 min presentation and - 30 min discussion