

CORSO DI LAUREA PROFESSIONALIZZANTE IN TECNOLOGIE DEL LEGNO
BERUFSBILDENDER BACHELOR IN HOLZTECHNIK

Contenuto degli insegnamenti
Inhalt der Lehrveranstaltungen

Primo anno / Erstes Jahr
<p>Mathematics</p> <ul style="list-style-type: none"> • Functions • Derivatives and integrals • Differential equation, fits, optimization
<p>Economy, Law, Contracts</p> <ul style="list-style-type: none"> • Current sources of contract law. The contract agreement and the contractual relationship. • Contracts between professionals (B2B) and contracts between professionals and consumers (B2C): different rules for the two kinds of relationships • Standard contracts and unfair terms. Unfair commercial practices. • The choice of the law applicable to international contracts. • Contract of Sale. International Sale and the Vienna Convention on international Sale of Goods. • Internet contracts. • General contract law and special rules for the electronic commerce. • Interests on debt and interest agreements. Credit and debt operations: assumption of debt • Assignment of credit and assignment of contract. • Credit guarantees. • Collateral securities and personal securities, bonds. • Guaranties in international contracts. • The regulation of firm networks. Actions to protect credit positions. • Dispute resolutions: traditional and alternative methods. • Arbitration and mediation; compulsory mediation
<p>Wood Chemistry</p> <ul style="list-style-type: none"> • recognition of wood species and the technological properties of wood • wood and wood-based materials • wood production systems
<p>Physics</p> <ul style="list-style-type: none"> • Grundlagen • Mechanik • Thermodynamik • Elektrostatik • Elektrischer Strom • Magnetismus

Wood anatomy and productive forestry

- Selvicoltura produttiva
 - Elementi di gestione forestale e filiera foresta-legno
- Anatomia del legno
 - Cenni di botanica sistematica forestale
 - Caratteristiche microscopiche e macroscopiche del legno
 - Riconoscimento delle specie legnose
- Tecnologia del legno
 - Variazioni della struttura del legno
 - Difetti, anomalie e alterazioni del legno
 - Massa volumica e umidità del legno
 - Proprietà fisiche e meccaniche
 - Assortimenti legnosi

Product Design

- Introduzione al design di prodotto
- Metodologia progettuale
- Design e processi
- Economia circolare
- Designers e prodotti

Fundamentals of programming

- Basic programming syntax and structure in Python
- Functions
- Conditional control structures
- Arithmetic, comparison and Boolean operators
- Data types

Technical Drawing - CAD

- Drawing standards
 - drawing lines
 - orthographic projections and axonometric drawings
 - section drawings
 - dimensioning
 - Peculiarities of architectural drawing
- Computer-Aided Design (CAD)
 - 2D CAD systems
 - Parametric 3D CAD systems for the modelling of industrial products
 - 3D CAD systems for graphics and application thereof in the building industry
- Interactions among different CAD environments

Logging, sawmill operations and traceability procedures of wood

- Timber procurement processes introduction
- General principles of forest utilisation operations
- Characterisation of the sawmill and of the products that can be obtained from primary processing
- Ergonomics and risks for operators in the sector
- Information systems in the wood industry

Secondo anno / Zweites Jahr

Heat and mass transfer

- opake und transparente Gebäudehülle
- Wärmebrücken
- Technische Standards und Normen
- Messungen und Testverfahren
- thermische und hygische Bauphysik
- Berechnungs- und Nachweisverfahren sowie die dafür relevanten Parameter (u.a. Bauteilaufbau, Wärmetransport, Wärmeverlust, Oberflächentemperatur, Luftfeuchte, Luftwechsel, Schimmelvermeidung, Diffusion, Energie und Energieeffizienz)

Material Sciences

- properties and characteristics of materials
- materials that will be dealt with are: metals and metal alloys, ceramics, polymers and composites
- mechanical behavior

Electronics, Diagnosis and Quality Control

- Introduction of Electronics
- Basics of measurement technique and instrumentation.
- Measurement methods and sensors used industrially
- Actuators, which are used industrially.
- Electronic circuits

Industrial Production Organization and Management

- Fundamentals of industrial production in the wood industry
- Strategic planning
- Processes and production organization
- Operational planning
- Supply management

Construction Site 4.0

- Timber constructions technologies – assembly and connection systems, prefabrication, transport and handling on site
- Industry 4.0 vs Construction 4.0 - the revolution of the intelligent connection of systems in construction
- Horizontal process digitization and information management in construction - BIM
- Digital automation before production - Computational Design and Digital Fabrication
- Management, optimization of resources and digital quality control - application of innovative technologies (Cloud, Augmented Reality and Virtual Reality) for checking installations and Facility Management of timber buildings.

Mechanics of Structures

- Statics of elastic bodies
- Statics of elastic bars
- Statics of elastic beams
- Torsion
- Energy methods in elastostatics
- Stability in elastostatics

Terzo anno / Drittes Jahr

Energy efficiency in wood production and final use

- Energy resources, vectors and global demand
- Thermodynamics principles
- Energy management systems (ISO 50001)
- Sustainability and circular economy concepts
- Energy efficiency analysis and evaluation of processes from forests to wood industry
- Energy efficiency analysis and evaluation in wood industry
- Energy efficiency analysis and evaluation of wood residues valorization and final use

Mechatronics and Process Automation

- Introduction to mechatronic systems and process automation
- Introduction to sensing and data acquisition elements
 - Software and data acquisition systems
 - Sensors, signals, and conditioning
- Introduction to functional design of machines
 - Electric drives and machines, principles of operation
 - Mechanical components for transmission of motion
 - Motor/load coupling, motor, and transmission sizing
 - Introduction and preliminaries of dynamics of mechanical systems
- Introduction to robotics systems
 - Definitions, structure, and classification of industrial manipulators
 - Kinematics and motion planning of manipulators
 - Industrial collaborative robotics
 - Robotic applications in wood processes

Industrial Plants and Logistics

- The operation system „Factory“ for contract manufacturers (Make-to-Order)
- Layout and space planning
- Investment decisions
- Plant and equipment maintenance

Manufacturing Technology

- Introduction to manufacturing engineering;
- Structure and mechanical behavior of metals;
- Metal forging processes;
- Metal rolling processes;
- Metal extrusion and drawing processes;
- Sheet metal forming processes;
- Machining and tool wear mechanisms;
- Advanced machining processes;
- Fundamentals of metal casting processes;
- Fusion and solid state welding processes;
- Fundamentals of additive manufacturing.

Operational Safety and LCA Evaluation

- Part 1: Operational Safety
 - Introduction to health and safety at work
 - European Directives on health and safety at work
 - Assessment and control of the main health and safety risks in the wood industry
 - The Machinery Directive and the safety of woodworking machines
- Part 2: LCA Evaluation
 - Introduction to environmental issues and eco-design
 - Environmental management systems
 - Air emissions and wastewater treatment
 - The life cycle assessment (LCA) methodology

High-Performance Buildings: Comfort, Energy Efficiency

- Framework of main laws and technical standards currently in force regarding building energy efficiency and the energy performance of building envelope components.
- Calculation tools and implementation of reference cases.
- Diagnosis of building energy performance and analysis of different solutions, for improvement and optimization – in particular, for the what concerns geometrical and material thermal bridges, windows and window-wall nodes.
- Multi-domain comfort analysis: assessment of thermal, visual, acoustic comfort and indoor air quality.
- Indoor lighting: artificial lighting system design and control.
- Acoustics: sound insulation of building elements, indoor acoustic quality.

High-Performance Buildings: Seismic Design and Fire Resistance

- Construction systems and basics of multi-storey wooden buildings
- seismic basics and terms
- seismic loads and load-bearing capacity
- earthquake resistant planning and design
- introduction into seismic calculation and assessment
- legal basics and terms of fire prevention
- fire behavior and fire resistance of timber components
- fire prevention of multi-storey wooden buildings
- introduction into Fire Safety Engineering (FSE)