



# Compendium of Course Modules

Accreditation

of the Master Degree Programme

Management of Textile Trade and Technology

Field of Study: Technical Textiles

Faculty Textile and Clothing Technology

Compiled on 27.11.2017

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Module **MTTT-10: Manufacturing of Textiles and Garments**

*Herstellung von Textilien und Bekleidung*

Language English

Responsible Prof. Dr. Marcus Weber

Workload HpW 4 CP 5

60h presence

43h preparation and follow-up work (exercises, literature, tutorials)

22h preparation for examination

Lectures

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Special Fields of Knitting	2	2	0	2	0	0	1
Teacher:	Prof. Dr. Weber, Marcus							
Precondition:								
Name:	3dimensional Textiles	2	3	0	2	0	0	1
Teacher:	Prof. Dr. Büsgen, Alexander							
Precondition:	knowledge about conventional weaving, knitting and braiding processes and fabrics thereof							

Examinations

Code No.	Name	Type	Examination
MTTT-10	Manufacturing of Textiles and Garments	Pr	written exam

Remarks

## General Aims of Module

- Analyse sample differences in warp and weft knitting, single, double
- Define difference between 2D, multiaxial and 3D
- Distinguish and explain warp knitting and 3D-weaving technologies and products
  
- Demonstrate detailed understanding of warp knitting technology (stitch formation and pattern technologies) in sketches and keywords
- Explain the production processes and structures of different pattern designs
- Choose adequate pattern technologies and contrast them to other technologies
- Analyse samples and classify them to categories and describe how to produce them
  
- Define technical terms of 3-dimensional textiles
- Explain spacer- and multilayer weave design
- Create multilayer weave repeat
- Design weaves of multilayer woven fabrics
- Know 3D shell fabrics, tubular structures, braided 3D textiles and knitted spacer fabrics
- Explain circular 3D fabrics and 3D woven shells and exemplify applications
- Analyse 3-dimensional braids, explain their properties and assign applications
- Describe manufacture and properties of 3D-reinforced composite
- Knowledge of thread orientation and resulting physical properties and suitable applications

## Special Fields of Knitting

### Content

Main theories about warp knitting technology are explained. The seminar explains different applications of warp knitted fabrics and how they are produced. The technologies of stitch and weft yarn insertion are explained as well as warp beam run-in and threading.

Applications are e. g.:

- Swim suits
- Sports wear
- Reinforcing fabrics
- Lace fabrics
- Tulle
- Nets

### Literature

- Spencer, D. J., Knitting technology - a comprehensive handbook and practical guide, Woodhead Publishing, Cambridge England, 2001
- Ullmann's Encyclopedia of Industrial Chemistry, Verlagsgesellschaft mbH, Weinheim 1995;
- Weber, K.-P. (Koautor), Textile Technology - Knitting
- Lesyková, Eva, Fachwörterbuch der Maschenwaren-Produktion: deutsch englisch italienisch = Meisenbach Verlag, Bamberg 1991
- Textile Terms and Definitions 10th edition. The Textile Institute Manchester 1995, ISBN 1870812778
- Weber, K. P.; Weber, M.: Wirkerei und Strickerei. Technologische und Bindungstechnische Grundlagen. (incl. CD-ROM) DFV Frankfurt 2008 including English Index
- Raz, S., Warp knitting production, Melliand Textilberichte Verlag, Heidelberg 1987
- Weber, K.-P., Standard and development in warp knitting machine constructions, TechnoDigest 1 (1980) 60-63
- Die Kettenwirkpraxis (KP), Zeitschrift für die Kettenwirkerei, Werkgemeinschaft Karl Mayer e. V., Obertshausen
- N. N.: Groz-Beckert - Knitting Needles. Company leaflet, Albstadt 1978

<http://www.youtube.com/user/MarcusOliverWeber>

## 3dimensional Textiles

### Content

1. Introduction
2. Multilayer woven textiles
  - tightly arranged multilayer fabrics
  - woven spacer fabrics
3. Woven stiffeners, ribs and panels
4. Seamless woven 3D shapes
5. Circular multilayer fabrics
6. 3D Braids
  - 2-step and 4-step braids
  - 3D horngear braids
  - 3D lace braids
7. Knitted spacer fabrics

### Literature

- Miravete, A. (ed.): 3-D textile reinforcements in composite materials, Woodhead Publishing Ltd., Abington Cambridge, 1999
- Tong, L. et.al.: 3D Fibre Reinforced Polymer Composites, Elsevier Science Ltd., Oxford, 2002
- Wulfhorst, B.; Büsgen, A.; Weber, M.: Three-dimensional textile intermediate products for the economical manufacturing of Construction elements made from fibre composite materials Mellind English, September 1990, pp. E 309 - E 313
- Mohamed, M.: Three-Dimensional Textiles, American Scientist, Vol. 78, No. 6, pp. 530 - 541 (Nov.- Dec. 1990)
- Büsgen, A.: Weaving and braiding processes for producing profiled composite fibre performs Band- und Flechtindustrie 3/1995, pp. 70-74
- Büsgen, A.: Gewebte Formen - Stand und Ausblick neuer Webtechnologien, Mellind Textilberichte 6/1999, S. 502-505
- Brookstein, D.: A comparison of multilayer interlocked braided composites with other braided composites, Proceedings of the 36'th int. SAMPE Symposium, San Diego 1991, pp 141-150
- Stig, Fredrik, 3D-reinforcement in Composites, doctoral thesis, KTH School of Engineering Sciences, Stockholm, 2012
- Tong, L. et al: 3D Fiber reinforced polymer composites, Elsevier Science Ltd. 2002
- Bilisik, K.: Multiaxis three dimensional (3D) woven fabric, chapter 5 in: Vassiliades, S. (ed.) Advances in modern woven fabrics technology, published by InTech Europe, Rijeka/Croatia (<http://www.intechopen.com/books/advances-in-modern-woven-fabrics-technology>)
- F. K. Ko, F. Schreiber, H.-J. Yang, T. Gries: Recent advancements in threedimensional braiding, Proceedings of the 1st World Conference on 3D-Fabrics and their Applications, 10.-11.April 2008, Manchester, UK

**Module MTTT-20: Advanced Textile Technologies***Spezielle textile Technologien*

Language English

Responsible Prof. Dr. Eberhard Janssen

Workload HpW 6 CP 7

90h presence

57h preparation and follow-up work (exercises, literature, tutorials)

28h preparation for examination

**Lectures**

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Technical Textiles	2	2	0	2	0	0	1
Teacher:	Prof. Dr. Janssen, Eberhard							
Precondition:	Textile Werkstoffe, Grundlagen Chemie und Physik, Grundlagen der Wirkerei, Verfahren und Maschinen (Textil)							
Name:	Production of Woven Technical Textiles	2	3	0	2	0	0	1
Teacher:	Prof. Dr. Büsgen, Alexander							
Precondition:	Detailed knowledge about woven fabrics, weaving and weaving preparation							
Name:	Advanced Finishing	2	2	0	2	0	0	1
Teacher:	Prof. Dr. Mahltig, Boris							
Precondition:	fundamental background knowledge in sciences, especially in chemistry and polymer science							

**Examinations**

Code No.	Name	Type	Examination
MTTT-20	Advanced Textile Technologies	Pr	written exam

**Remarks**

## General Aims of Module

The students understand why they have to choose special polymer materials for each field of personal protective clothing. They are able to define the requirements of the consumer and to transfer these requirements in specifications of the product or the polymer material.

The students can assess which steps are necessary to reach special characteristics of the product. They are able to use the preparation measures.

This knowledge will qualify the students to recognize what are the important parameters of the finishing process, to carry out the process and to see the influence of the finishing process to the following processes like lamination or bonding.

## Technical Textiles

### Content

The lecture will give the Students explanation of the demands of personal protective clothing. We will look at special applications and we will get an understanding, why the producers of PPC choose the polymer material, why it is necessary to develop new tests and new test equipments and what the tasks of special protective clothing are as a part of a complete protection system

- Personal protective clothing
- Legislation for PPC
- Ballistic protection
- Heat protection
- Cold protection
- Electrical protection
- Chemical protection
- Clothing for clean rooms
- Medical & hygiene

### Literature

Engels, H; Janssen, E.: Technische Textilien - Faserwerkstoffe und Anwendungsbeispiele, Arbeitgeberkreis Gesamttextil, 1998

Fung, W.; Hardcastle, M.: Textiles in automotive engineering, The Textile Institute, Woodhead Publishing Limited, Cambridge, 2001

Horrocks, A.R.; Anand, S.C.: Handbook of technical textiles, The Textile Institute, Woodhead Publishing Limited, Cambridge, 2000

Adanur, S.: Paper Machine Clothing, Technomic Publishing Company, Lancaster PA 1997



## Production of Woven Technical Textiles

### Content

1. Introduction
2. Materials and yarns for technical textiles
3. Weaving preparation and weavinof of technical textile materials
4. Precision fabrics
5. Fabrics for filtration
6. Forming Fabrics
7. Airbag fabrics
8. Tire cord and tire cord fabrics
9. Glass fiber fabrics for reinforcing PCB's
10. Geo-, agricultural and architectural textiles
11. Acoustic fabrics

### Literature

- A. Richard Horrocks; Subhash C. Anand:  
Handbook of technical textiles, Woodhead Publishing, Cambridge 2000
- Adanur, S.:  
Wellington Sears handbook of industrial textiles, Technomic Pub. 1995
- Huschke, R.: Präzisionsgewebe - Eigenschaften, Herstellung und Anwendung, Die Bibliothek der Technik (Band 280), SZ Scala GmbH, 2005
- Adanur, S.:  
Paper machine clothing - key to papermaking process, Technomic Publishing AG, Basel, 1997
- Wakeman, R. et al:  
Filtration, Elsevier Science Ltd., Oxford 1999
- Knapek, S.:  
Forming applications on PM - packaging grades, 2010-04-22, 8
- Mukhopadhyay, S.K.:  
Technical developments and market trends of automotive airbags, chapter 12 in: Shishoo, R. (ed.): Textile advances in the automotive industry, Woodhead Publishing Ltd, Cambridge 2008, pp. 255-269
- Dudek, R., Goldmann, P., Kuhn, J.:  
Advanced glass reinforcement technology for improved signal integrity, Printed Circuit Design & Fab, February 2008, pp. 40-42

## Advanced Finishing

### Content

Introduction into structure/property relation and finishing/fiber relation  
Concept of anchor and function

Chemistry and properties of a selection of the following finishes:

- Easycare finishes
- Antimicrobial finishes
- Hydrophobic and oleophobic finishes
- Soil-Release finishes
- Antistatic finishes
- Hydrophilic finishes
- Plasmatechnology
- Flame retardant finishes
- UV-protection
- Photocatalytic applications
- Polyurethane-, Siliconresin-, Acrylate- und Polyvinylchloride coating
- Hotmelt-Lamination

### Literature

- R. Paul: Functional Finishes for Textiles, Woodhead Publishing, 2015  
B. Mahltig, T. Textor: Nanosols and Textiles, World Scientific, 2008  
B. Jastorff, R. Störmann, U. Wölcke: Struktur-Wirkungs-Denken in der Chemie, Universitätsverlag  
Aschenbeck & Isensee, 2003  
H. Rath: Lehrbuch der Textilchemie, Springer-Verlag, 2013  
A. Giessmann: Substrat- und Textilbeschichtung, Springer-Verlag, 2013  
J. Shore: Cellulosics Dyeing, Society of Dyers and Colourists, 1995  
D. Heywood: Textile Finishing, Society of Dyers and Colourists, 2003  
R. Paul: Functional Finishes for Textiles, Woodhead Publishing, 2015  
A.K.R. Choudhury: Textile Preparation and Dyeing, Science Publishers, 2006

Module **MTTT-30: Environmental Management and Business Ethics**  
*Umweltmanagement und Wirtschaftsethik*

Language English

Responsible Prof. Dr. Lutz Vossebein

Workload HpW 2 CP 3

30h presence

30h preparation and follow-up work (exercises, literature, tutorials)

15h preparation for examination

#### Lectures

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Environmental Management and Business Ethics	2	3	0	2	0	0	1
Teacher:	Prof. Dr. Vossebein, Lutz							

Precondition:

#### Examinations

Code No.	Name	Type	Examination
MTTT-30	Environmental Management and Business Ethics	Pr	written exam

#### Remarks

## General Aims of Module

The learner is able to identify responsibilities of natural resources and name relevant laws and regulations. The students know the basic theory of ecology, sustainability, the principle of Corporate Social Responsibility and can apply general process integrated environmental protection programmes in textile and clothing industry. Furthermore they know about the risks and the origin of hazardous chemicals in textile production as well as the textile concerns with REACH. Within the lecture the communication skills and teamwork capability will be improved by giving a team presentation.

## Environmental Management and Business Ethics

### Content

The learner is able to identify responsibilities of natural resources and name relevant laws and regulations.

The students know the basic theory of ecology and can apply general process integrated environmental protection programmes in textile and clothing industry. Furthermore they know about the risks and the origin of hazardous chemicals in textile production as well as the textile concerns with REACH.

Students will learn how to evaluate specific governmental, non-governmental and private eco labels.

The students have to give a team presentation of an environmental related topic.

### Content

- Quality
- Basic definitions of ecology
- Population development
- Ecological footprint
- Environmental law
- Eco labels
- Cycles of matter
- Energy sources
- Water management and waste water treatment
- Exhaust air treatment
- Waste management
- Recycling technology
- Life cycle analysis

### Literature

DIN EN ISO 14001: Environmental management systems - Requirements with guidance for use (ISO 14001:2015); German and English version EN ISO 14001:2015

DIN EN ISO 14004: Environmental management systems - General guidelines on principles, systems and support techniques (ISO 14004:2004); German and English version EN ISO 14004:2010

DIN EN ISO 14040: Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006); German and English version EN ISO 14040:2006

DIN EN ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines (ISO 14044:2006); German and English version EN ISO 14044:2006

DIN EN ISO 14050: Environmental management - Vocabulary (ISO 14050:2009); Trilingual version EN ISO 14050:2010

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC

Bell, S.: Sustainability Indicators, Erarscan, London, 2001.

Blackburn, R.: Biodegradable and Sustainable Fibers, CRC Press, Woodhead Publishing, 2005.

Burrall, P.: Product Development and the Environment, Gower Publishing, Aldershot, 1996.

Rouette, H.-K.: Encyclopedia of Textile Finishing, Vol. 1-3, Springer Verlag Heidelberg, 2001.

Rees, W.: Our ecological footprint

Journal: e.g. Melliand (English)

**Module**                    **MTTT-40: Master-Projects**  
                                       *Master-Projekte*  
**Language**                 English  
**Responsible**             Prof. Andrea Rieschel  
**Workload**                HpW    3            CP            6  
                                       45h    presence  
                                       70h    preparation and follow-up work (exercises, literature, tutorials)  
                                       35h    preparation for examination

**Lectures**

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Master-Projects	3	6	0	0	0	3	1
Teacher:	Prof. Dr. Rabe, Maike							
Precondition:								

**Examinations**

Code No.	Name	Type	Examination
MTTT-40	Projects (Master)	T	Certificate

**Remarks**

## General Aims of Module

The students are involved in research activities of the faculty. They intensify the knowledge of the previous studies with a special focus on interdisciplinary combination of topics. Analytical, scientific and practical skills are gained by the students during the project work especially to prepare them well for the master thesis.

## Master-Projects

### Content

The subject offers individual topics which refer to the textile production chain. The students learn how to manage a project, how to contact companies and cooperate with industrial partners. Further more they study the context of their group topic and present the results in a written report as well as in a presentation.

### Literature

Module **MTTT-50: Innovative Materials and Products**

*Innovative Materialien und Produkte*

Language English

Responsible Prof. Dr. Alexander Büsgen

Workload HpW 4 CP 5

60h presence

43h preparation and follow-up work (exercises, literature, tutorials)

22h preparation for examination

Lectures

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Innovative Materials and Products	4	5	0	4	0	0	1
Teacher:	Prof. Dr. Büsgen, Alexander							
Precondition:	Basic knowledge about yarn and fabric technology							

Examinations

Code No.	Name	Type	Examination
MTTT-50	Innovative Materials and Products	Pr	written exam

Remarks



## General Aims of Module

The learning outcome of innovative materials and products is two-folded.

The first part enables students to execute a formal procedure and method for selecting, evaluating and designing a new and innovative product. They are able to execute an idea screening, an evaluation and a selection of best ideas. Furthermore, they can apply a cost and technology rating for alternatives and variations of a new product idea. Students are trained to apply and use this method for any new product development task.

The second part provides students with a basic understanding of two modern textile areas offering fast and dynamic growing markets: composite material reinforcements and smart textile materials. Students know the production methods and properties of these materials. They are able to make up their mind about the use, advantages and disadvantages of composites and of smart textiles. They are able to apply these textiles to fulfill individual product requirements.

## Innovative Materials and Products

### Content

#### 1. Innovative Product Development

- strategies and procedures for new product development,
- Idea generation procedures and idea screening methods
- Calculation of manufacturing costs and cost price (overhead calculation)
- Conceptual design: creation of sub tasks by breaking down the main task, finding of alternative solutions for each sub task, cost- and quality evaluation for each suggestion, calculation of optimized results

#### 2. Composite materials

- materials, properties, applications
- manufacturing processes of composites
- textile reinforcements

#### 3. Smart Textiles

- sensoric textiles (ECG, keyboard, smart carpet)
- light emitting textiles
- thermal active textiles

### Literature

Büsgen, A., New product development in interior textiles, Chapter 8, pp 132 - 155

in: L. Horne (ed). New Product Development in Textiles: Innovation and Production, Woodhead Publishing Ltd., Oxford 2012

Büsgen, A., Innovative Textiles for Seating, Chapter 11, pp 258 - 273

in: T. Rowe (ed)., Interior Textiles - Design and developments, Woodhead Publishing Ltd., Oxford 2009

Mogahzy, Y.E.EL, Engineering textiles, Woodhead Publishing Ltd, Cambridge 2009

Tao, Xiaoming (ed): Smart Fibres, Fabrics and Clothing, Woodhead Publishing Ltd., Oxford 2001

van Langenhove, Lieva (ed): Smart textiles for medicine and healthcare, CRC Press, University of Virginia, 2007

McCann, J., Bryson, D. (ed): Smart clothes and wearable technology, Elsevier, 2009

Module **MTTT-60: Production Engineering**  
*Fertigungsentwicklung*

Language English

Responsible Prof. Dr. Yordan Kyosev

Workload HpW 6 CP 6

90h presence

40h preparation and follow-up work (exercises, literature, tutorials)

20h preparation for examination

### Lectures

		HpW	CP	L	SL	Ex	P	Sem.
Name:	High Performance Fibers	2	2	0	2	0	0	2
Teacher:	Prof. Dr. Mahltig, Boris							
Precondition:	fundamental background knowledge in sciences, especially in chemistry and polymer science							
Name:	Digital Printing for Technical Textiles	2	2	0	2	0	0	2
Teacher:	Prof. Dr. Muth, Mathias							
Precondition:								
Name:	Advanced Narrow Fabrics	2	2	0	2	0	0	2
Teacher:	Prof. Dr. Kyosev, Yordan							
Precondition:	Schmaltextilien/Narrow Fabrics; Weaving; Mathematics							

### Examinations

Code No.	Name	Type	Examination
MTTT-60	Production Engineering	Pr	written exam

### Remarks

## General Aims of Module

The students have broad understanding of chemical and physical background of high performance fiber and know the relations between the chemical and molecular structure and function of these fibers. They can select most adequate fiber for a certain application and argue the decision with data about the physical, chemical, thermal and other properties.

Based on the selected fibers the students can develop narrow woven and braided structures, satisfying conditions about their parameters - as structures, geometry of the cross section, elasticity modulus, cover factor and can choose the best suitable technology and machines for the production of such products.

Based on the advanced knowledge in the area of digital textile printing the students can select adequate printing systems, i.e. hardware, software and substrates for technical and other special applications. They can apply as well some functional treatments for technical textiles such as water repellents, antimicrobials, antistatic and hydrophilic finishes.

## High Performance Fibers

### Content

- General introduction into high performance fibers and high performance properties
- Introduction to properties, units and testing methods
- For each fiber:
  - chemical background
  - preparation
  - structure
  - properties
  - advantages
  - disadvantages and
  - textile applications

View on specific fibers:

- Polyacrylonitrile PAN; PAN modifications, copolymers, Preox-fibers
- Chlorinated Fibers; Polyvinylchloride PVC, syndio-PVC, chlorinated PVC, Polyvinylidenchloride
- Fluorinated Fibers; Polyvinylfluoride, Polyvinylidenfluoride, Polytetrafluoroethylene PTFE
- Polyvinylalcohol; water-soluble and water-unsoluble modifications
- Aramids; different types
- Polyimide
- Polyamidimid
- Polyetherimid
- Gel-Spun High-Performance Polyethylene Fibers, Dyneema fibers
- Future technologies: fibers from carbonnanotubes and graphene
- Polyetherketones
- Polyphenylensulfide
- Special polyesters, special polyamides; concept of "liquid crystalline polymers and fibers"
- Inorganic fibers, as carbon fibers, glass fibers, basalt fibers, ceramic fibers, silicon carbid fibers
- Functional cellulosic fibers, lyocell process
- Biopolymers and fibers

### Literature

- J. W.S. Hearle: High Performance Fibres, Woodhead Publishing, 2001  
W. Loy, Chemiefasern für technische Textilprodukte, Deutscher Fachverlag, 2008

## Digital Printing for Technical Textiles

### Content

- Basics of Digital Textile Printing
- Definitions
- Market data
- Trends and perspectives
- Basics of Technical Textiles
- Definitions
- Fibers for Technical Textiles
- Market data
- Trends and perspectives
- Functionalisation of Technical Textiles
- Functional treatments
  - Antistatic
  - Antimicrobial
  - Hydrophobic/oleophobic
  - Hydrophilic
  - Electric conductivity
- InkJet Technology
- Drop-On-Demand vs. Continuous InkJet
- Print head technology
  - Piezo
  - Bubble Jet
  - Valve Jet
- Inks for digital textile printing of technical textiles
- Requirements on inks
- Water-based vs. solvent inks
- Dye-based vs. pigment inks
- Ecological aspects of digital textile printing

### Literature

Digital Textile, different issues, World Textile Information Network  
H. Ujiie: Digital Printing of Textiles, Woodhead Publishing, 2006  
Ch. Cie: InkJet Textile Printing, Woodhead Publishing, 2015  
H.-K. Rouette: Enzyklopädie Textilveredlung, Deutscher Fachverlag, 2008

## Advanced Narrow Fabrics

### Content

- Preparation of weaving plans for the production of complex profiles on narrow weaving machine (Omega, T)
- Partial carrier occupation of braiding machines
- 3D braiding/ branch braiding ("Verzweigungsflechtmaschine VF")
  - design of pattern, programming, production and evaluation
- Relation between machine parameters, yarn parameters and product properties, especially geometrical and mechanical properties as thickness, diameter, elastic elongation, tensile strength, cover factor of braids and narrow woven tapes
- Product development for special topics in the area of tapes, ropes, medical products and other braided or narrow woven products from current research projects

### Literature

Kyosev, Y., Skript Schmaltextilien

Kyosev, Y., Braiding technology for textiles, Woodhead Publishing, 2014

Kyosev, Y., (Ed.), Advances in the braiding technology, Woodhead Publishing, 2016

Essig, E., Nadel-Bandwebtechnik, Jakob Müller Institute of Narrow Fabrics, 2005

Kipp, H.-W.: Bandwebtechnik, JTM-Stiftung, Frick (Hrsg.), Verlag Sauerländer, Frankfurt a.M. 1998

Engels, H.: Flechttechnologie - Schmucktextilien - Technische Textilien, Arbeitgeberkreis

Gesamttextil/Industrieverband Deutscher Bandweber und Flechter e.V. (Hrsg.) Eschborn, 1996

Melliand Band- und Flechtindustrie / Euroseil Deutsche Seilerzeitung, Fachzeitschrift, Erscheinungsweise: vierteljährlich

Verlag Melliand Textilberichte, Deutscher Fachverlag GmbH

Atkins and Pearce Handbook of Industrial Braiding, F. Ko, C. Pastore, and A. Head, Atkins and Pearce, Covington KY, October, 1989

H A McKenna, J W S Hearle, N O'Hear, Handbook of fibre rope technology, Woodhead Publishing Limited

**Module** **MTTT-70: Development and manufacturing of functional and protective**  
*Herstellung von Schutzbekleidung*  
**Language** English  
**Responsible** Prof. Dr. Karin Finsterbusch  
**Workload** HpW 2 CP 3  
 30h presence  
 30h preparation and follow-up work (exercises, literature, tutorials)  
 15h preparation for examination

**Lectures**

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Development and manufacturing of functional and protective garments	2	3	0	2	0	0	2
Teacher:	Prof. Dr. Finsterbusch, Karin							
Precondition:								

**Examinations**

Code No.	Name	Type	Examination
MTTT-70	Development and manufacturing of functional and protective garments	Pr	written exam

**Remarks**



## General Aims of Module

The lecture gives a review over selected fields of protective and functional clothing. It delineates the different purpose of both groups of garments.

Students get deep knowledge of the application of construction kit systems for the development of "protective clothes".

## Development and manufacturing of functional and protective garments

### Content

- Fundamental definitions
- What are protective clothes?
- What are functional clothes ?
- History of protective clothes from " blue boiler suit" to clothes for "cleanrooms"
- Categories of protective clothes
- Fabrics and additions for development of protective clothes
- Categories of warning clothes
- Laws/engineer standards in different countries and inside the EU
- Test procedures of conformance to requirements
- Functional and realization analysis for selected outfits for protection and function
- Construction kit systems(structure, function, application, assets and drawbacks)
- Pattern construction kit for "Protective Clothes"
- Characteristics in pattern making of protective clothes
- List of manufactures and their special skills
- Additional: study trips to companies and fairs, e.g.. A+A Düsseldorf (2017)

The practical training "CAD protective clothes" completes the lecture with training in a selected CAD-System for pattern making of functional and protective clothes.

### Literature

Students get a custom-built hand-out for the practical training

Useful websites from manufacturers:

S-Gard, HB-protective clothes, Mewa, Stiehl, Seamtex etc.

3M

**Module**            **MTTT-80: Management**  
                               *Management*  
**Language**         English  
**Responsible**      Prof. Dr. Walter Harsch  
**Workload**         HpW    6            CP            6  
                               90h    presence  
                               40h    preparation and follow-up work (exercises, literature, tutorials)  
                               20h    preparation for examination

**Lectures**

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Advanced Management Skills	4	4	0	4	0	0	2
Teacher:	Prof. Dr. Harsch, Walter							
Precondition:	None							
Name:	Organisational Behaviour	2	2	0	2	0	0	2
Teacher:	Prof. Dr. Weber, Marcus							
Precondition:								

**Examinations**

Code No.	Name	Type	Examination
MTTT-80	Management	Pr	written exam

**Remarks**

## General Aims of Module

Leaders are met with a variety of demands. For example, they have to take decisions, lead their employees, convince customers and develop their areas of activity. In addition they know about intercultural and ethical aspects and the development of activities in the global business.

The students get to know essential elements of human behaviour. They are able to realize behaviour patterns and objectives of men as well as limits of the scope of action. Furthermore they know proceedings and working methods which support their management tasks. Therefore they are able to lead and develop employees, departments or companies with regard to economical, social and ethical aspects.

## Advanced Management Skills

### Content

- Management - Introduction
- Intercultural management
- Ethics
- Taking decisions
- Leadership/leadership by objectives
- Leadership by challenge
- Delegation
- Effective meetings
- Strategies including working methods for designing strategies
- Lean Production
- Change Management
- Personnel Time Management
- Key figures for management
- Generation Y
- Going global
- Excursions to industrial companies

### Literature

- Cube, Felix von et al: Führen durch Fordern. München, 2005
- Blom, H.; Meier, H. (Hrsg.): Interkulturelles Management. Herne, Berlin, 2002.
- Holzbaur, U.: Management. Ludwigshafen (Rhein), 2000.
- Rahn, H.-J.: Unternehmensführung. Ludwigshafen (Rhein), 5. Auflage, 2002.
- Heß, M.: TQM/KAIZEN-Praxisbuch. Verlag TÜV Rheinland, 1994.
- Kostka, C.; Mönch, A.: Change Management. München, Wien, 2002.
- Harsch, W.: Manuscript, version of the relevant semester.
- Hindle, T.: Manage your time. London, New York, Sydney, Moscow, 1998.
- Heller, R.: How to delegate. London, New York, Sydney, Moscow, 1998.

## Organisational Behaviour

### Content

The students study on their own new topics of organisational behaviour in given scientific articles. The main message and key results have to be presented to the plenum. Further the article has to be classified into the different topics of Organizational Behaviour. For deeper understanding and better knowledge acquisition all topics and articles are available to the students in copy or in the book (library).

- Foundation of Individual Behaviour
- Attitudes and Job Satisfaction
- Personality and Values
- Perception and Individual Decision Making
- Motivation Concepts
- Motivation: From Concepts to Applications
- Emotions and Moods
- Foundations of Group Behaviour
- Understanding Work Teams
- Communication
- Basic Approaches to Leadership
- Contemporary Issues in Leadership
- Power and Politics
- Conflict and Negotiation
- Foundations of Organization Structure
- Organizational Culture
- Human Resources Practices
- Change and Stress Management

### Literature

Robbins: Organizational Behaviour. Pearson International

Examples of scientific articles:

Employers Skill Survey (2001) An assessment of skills needs in the clothing, textiles, footwear and leather and furniture, furnishings and interiors industries in United Kingdom

Bardack/McAndrew (1985) The influence of physical attractiveness and manner of dress on success in a simulated personnel decision

Mehrabian (1952) Inference of attitudes from nonverbal communication

Tyler (1999) Basic skills training pays off for employers

Ehrenfeld (2008) Managing to See - How visual tools and techniques help managers lead with the whole brain

Sullivan (2008) The case for hands on education

Caruso (2008) The real value of Intangibles

Schmidt/Hunter (1998) The validity and utility of selection methods in personnel psychology: Practical and theoretical implications of 85 years of research

**Module**            **MTTT-90: Practical Training (Alternatives)***Praktikum (Alternativangebote)*

Language            English

Responsible        Prof. Dr. Mathias Muth

Workload           HpW    6            CP            2

90h presence

-27h preparation and follow-up work (exercises, literature, tutorials)

-13h preparation for examination

**Lectures**

		<b>HpW</b>	<b>CP</b>	<b>L</b>	<b>SL</b>	<b>Ex</b>	<b>P</b>	<b>Sem.</b>
Name:	Manufacturing of Protective Clothes	2	2	0	0	0	2	2
Teacher:	Prof. Dr. Finsterbusch, Karin							
Precondition:								
Name:	CAD Protective Clothes	2	2	0	0	0	2	2
Teacher:	Prof. Dr. Finsterbusch, Karin							
Precondition:								
Name:	Practical Training Digital Printing	2	2	0	0	0	2	2
Teacher:	Prof. Dr. Muth, Mathias							
Precondition:								

**Examinations**

<b>Code No.</b>	<b>Name</b>	<b>Type</b>	<b>Examination</b>
MTTT-91	Manufacturing of Protective Clothes	T	Certificate
MTTT-92	CAD Protective Clothes	T	Certificate
MTTT-93	Practical Training Digital Printing	T	Certificate

**Remarks**

## General Aims of Module

After an introduction to digital textile printing technologies students will learn all important steps of inkjet printing, such as creating a design with a suitable file format, colour separation, dye selection and ink formulation. The importance of colour profiling and pretreatment of textile substrates prior to printing will be understood. The students will be able to select the right chemistry and dyestuffs for the different fibers.

The students know all parts of digital printing systems and learn how to use and maintain digital printing machines.

The students will learn pretreatment, fixation and aftertreatment for the various types of inks and fibers, and will be able to identify the requirements on colours and textiles for the different procedures. The students get to know the possibilities and limitations of digital textile printing and can compare advantages and disadvantages versus conventional textile printing methods.

## Manufacturing of Protective Clothes

### Content

Based on the specific function of protective clothes and the particular requirements on manufacturing the practical training includes the introduction into selected examples of protection challenges.

During the practical training multiple possible solutions coming from pattern making will be figured out and discussed. Selected examples will be realized and manufactured with the required materials and joining techniques.

In addition to the theory excursions to selected companies will complete the lecture.

### Literature

## CAD Protective Clothes

### Content

#### Objectives:

The lecture will transmit the knowledge to use a 2D-software for pattern construction, grading and marker making in the industrial context of protective clothes production.

After having successfully completed the lecture the participants will be able to create all production pieces of selected protective garments within the software - for all required materials - fabric, lining, interlining - and at the end build a print file on scale of 1:1 in individual or graded sizes.

#### Content:

The 2D Software for construction of garments in CAD-System "Grafis"

- Historical progress of Grafis
- Working with collections and styles
- Creating measurement charts - standard and individual, body measurements and finished measurements
- Creating basic blocks and styles with variable values and calculated values
- Calling, using and adjusting interactive basic blocks
- Creating garment styles in different levels of development by the use of hereditary automatic
- Familiarization to all standard and interactive tools for style development
- Creating examples for a construction kit for protective clothes for use in Grafis calling list
- Printing patterns
- Grafis grading - grade rule grading
- Marker making

### Literature

Friedrich, K.: GRAFIS- Handbuch, aktuelle Version

Finsterbusch, Karin; Mosinski, Erich; Pohl, Herbert: Grundlagen der Bekleidungskonstruktion - System OPTIKON; Hochschule Niederrhein, 4. neubearbeitete und erweiterte Auflage, englischsprachig, 2001  
Hillers, Eva u.a.: Bekleidungskonstruktion System OPTIMASS, Hochschule Niederrhein, 2001

#### Internetquellen:

Internetseiten der Firmen GRAFIS sowie S-Gard, HB-Schutzbekleidung, Mewa, Stihl, Seamtex u.a.m.

Zusätzlich wird den Studierenden ein detailliertes Skript angeboten

## Practical Training Digital Printing

### Content

- Basics of Digital Textile Printing
- Definitions
- Market data
- Trends and perspectives
- Overview on InkJet Technology
- Drop-On-Demand vs. Continuous InkJet
- Print head technology
  - Piezo
  - Bubble Jet
  - Valve Jet
- Introduction to Printing Laboratory
- Printing machines
  - Mimaki Tx2 (sample printer)
  - Epson transfer printer
  - MS JP5 (textile printer)
  - Chromojet (mat printer & table top printer)
  - Kornit Breeze (T-Shirt printer)
- Transfer press
- Textile periphery of digital textile printing
- Coating of textile substrates
- Basics of Colour Management Software
- Design requirements
- Colour separation
- Colour Profiling

### Literature

Digital Textile, different issues, World Textile Information Network  
H. Ujiie: Digital Printing of Textiles, Woodhead Publishing, 2006  
Ch. Cie: InkJet Textile Printing, Woodhead Publishing, 2015  
H.-K. Rouette: Enzyklopädie Textilveredlung, Deutscher Fachverlag, 2008



Module **MTTT-140: Electives (Master)**  
*Wahlpflichtfächer (Master)*

Language English

Responsible . - alle Lehrende des Fachbereichs

Workload HpW 4 CP 6  
 60h presence  
 60h preparation and follow-up work (exercises, literature, tutorials)  
 30h preparation for examination

### Lectures

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Electives (Master)	4	6	4	0	0	0	2
Teacher:	alle Lehrende des Fachbereichs							
Precondition:								

### Examinations

Code No.	Name	Type	Examination
MTTT-14	Electives (Master)	Pr	written exam

### Remarks

## General Aims of Module

Students have to select from a broad list of offered lectures (see electives catalogue) at least a volume of 4 CH.

By this students can individually focus on desired fields of knowledge.

## Electives (Master)

### Content

students may individually select from a list of offered lectures (see electives catalogues).

### Literature

according to selected lecture

Module **MTTT-150: Research&Development Project**

*Forschungs- und Entwicklungsprojekt*

Language English

Responsible Prof. Dr. Boris Mahltig

Workload HpW 4 CP 8

60h presence

93h preparation and follow-up work (exercises, literature, tutorials)

47h preparation for examination

Lectures

		HpW	CP	L	SL	Ex	P	Sem.
Name:	Research&Development Project	4	8	0	0	0	4	2
Teacher:	Prof. Dr. Mahltig, Boris							
Precondition:	related to the topic of the project							

Examinations

Code No.	Name	Type	Examination
MTTT-15	Research&Development Project	Pr	Elaboration

Remarks

## General Aims of Module

The students have an overview over the research activities of the faculty and are introduced in a current research project. They apply learned topics to current problems and participate in the interdisciplinary work. Research results are evaluated systematically and critically. Analytical, scientific and practical skills are gained by the students during the project work especially to prepare them well for the master thesis.

## Research&Development Project

### Content

The project content is determined together with the supervisor and has to be fixed at the start of the project.

Main contents are:

- literature work
- searching literature
- systematic presentation and evaluation of project and research results

### Literature

The independent search for literature is part of the project work of each student.

Helpful for writing thesis, longer reports or scientific text

- V. Ahrens, Abschlussarbeiten richtig gliedern, 2014, vdf Hochschulverlag Zürich
- E. Müller, Schreiben in Naturwissenschaften und Medizin, 2013, UTB
- J. T. Yang, Scientific Writing, 1995, World Scientific, Singapore
- R. Bradbury, Zen in the Art of Writing, HarperCollins UK