

Module Description

Dental Technology – Manufacturing, Digital Applications, Materials, Science

Module 1 / MDAMS	Dental Technology – Manufacturing, Digital Applications, Materials, Science	Compulsory module	5 CP (total) = 150 h	
			Contact study 8 h in form of block sessions	Self-study 142 h
Contents				
<p>The module teaches the current level of knowledge in the field of Dental Technology by means of lectures and seminars. It teaches the context between current developments in the health system – in particular in dental medicine – and the resultant role of the dental technician in a therapeutic team.</p> <p>Based on this the clinical requirements of dental prepared restorations are explained.</p> <p>In particular therapeutic approaches to improve the aesthetics are differentiated between pure surgery that changes the tissue, applied dental materials as well as a combination of both.</p>				
Learning outcomes /Competence objectives				
<p>The clinical competence of the students will be extended by the selective demonstration of all therapeutic concepts within the different disciplines of teeth-, mouth- and jaw medicine to the replacement of missing oral tissue and the improvement in orofacial aesthetics.</p> <p>The students gain a lasting knowledge of how functional and aesthetic excellent overall results in restorative dental medicine on the one hand in most complex interdisciplinary treatment processes and on the other hand in the quality of dental prepared restorations and materials used. They are able to appreciate the interaction of therapeutic approaches and materials.</p>				
Requirements to participate in the module and individual sessions of the module				
None				
Recommended requirements				
None				
Allocation of the module (course / faculty)			Dental Technology/ Faculty 16	
Usability of the module for other courses			-	
Availability			Once pro semester	
Length of the module			One semester	
Module Coordinator			Dr. Paul Weigl	
Proof of study /where applicable as exam preparation				
Proof of attendance			None	
Proof of work			None	
Teaching / Learning formats				
Lesson / Examination language			English / In the case of a purely German cohort: German	
Module examination			Format / Length / Contents where applicable	
Final module examination consisting of :			Examination (graded) / length of examination: 60 min.	
cumulative module examination consisting of :				
Establishing the grade by cumulative module examinations:				

	Lesson format	CP	Semester				
			1	2	3	4	5
Dental Technology – Manufacturing, Digital Application, Materials, Science	Lecture	5	x				
Module examination	Examination	-					
Total		5					

Module Description *Material Sciences*

Module 2/ MS	Material Sciences	Compulsory module	5 CP (total) = 150 h	
			Contact study 8 h in form of block sessions	Self-study 142 h
Contents				
<p>The module imparts knowledge about the scientific description and examination of the materials used in dentistry. In particular the potentially allergic and /or toxic interaction of the material surface with the adjoining oral tissue and the clinical long-term implications are taught.</p> <p>The methods of an objective scientific evaluation of the clinical reaction of a new material will be examined (prospective/retrospective clinical studies, animal studies, cell experiments, mechanical material testing, surface scanning etc.). Potential and limitations of individual examination methods will be critically analysed.</p>				
Learning outcomes /Competence objectives				
<p>The students are enabled to independently and objectively evaluate dental material based on results from scientific examination methods for their clinical reaction. On completion of the module the students are in the position to be able to compare in detail the statements from clinical studies with animal experimental and in-vitro examinations when new dental materials are launched onto the market.</p>				
Requirements to participate in the module and individual sessions of the module				
None				
Recommended requirements				
None				
Allocation of the module (course / faculty)			Dental Technology / Faculty 16	
Usability of the module for other courses			-	
Availability			Once pro semester	
Length of the module			One semester	
Module Coordinator			Prof Dr. mult. Robert Sader	
Proof of study /where applicable as exam preparation				
Proof of attendance			None	
Proof of work			None	
Teaching / Learning formats				
Lesson / Examination language			English / In the case of a purely German cohort: German	

Module examination			Format / Length / Contents where applicable				
Final module examination consisting of :			Examination (graded) / length of examination: 60 min.				
Cumulative module examination consisting of :							
Establishing the grade by cumulative module examinations:							
	Lesson format	CP	Semester				
			1	2	3	4	5
Material Sciences	Lecture	5	x				
Module examination	Examination	-	x				
Total		5					

Module Description *Digital Design and Planning*

Module 3/ DDP	Digital Design and Planning	Compulsory module	8 CP (total) = 240 h	
			Contact study 28 h in form of block sessions	Self-study 212 h
Contents				
<p>In the module “Digital Design and Planning“ software products available on the market to design fillings, chips, crowns and bridges, implant abutments, removable dentures, occlusal splints and orthodontic brackets and appliances will be critically discussed regarding their quality, their efficiency as well as their application will be trained in workshops using case studies.</p> <p>Students will be taught to create a virtual patient from varying data sets (CT, DVT, MRT, optical 3D surface scan etc.) and to make a 3D print for this or selected elements.</p> <p>Further potential as well as a risk-benefit analysis for digital planning on virtual patients will be taught to students.</p> <p>The methodology and safety of a complete/correct transfer of a digitally planned treatment to the real patient plays a decisive role when working on the selection criteria for an appropriate planning and design software.</p>				
Learning outcomes /Competence objectives				
<p>At the end of the module the students can independently digitally design and produce dental restoration with the help of corresponding software and with appropriate downstream mechanical moulding (NC-milling machines, 3D-printers etc.) They achieve the competence to independently and objectively select software products.</p> <p>The students are able to generate a “virtual“patient with the aid of three dimensional medical imaging (CBCT, CT, MRT, 3D-surface scan) and to plan, design and produce medical restorations on it either directly or on the 3D-print-out. They can use a structured risk-benefit analysis to compare on a case by case basis using this method with the conventional medical production of restorations in particular with regard to the challenge to undertake a complete/correct transfer of a digitally planned treatment on the real patient.</p>				
Requirements to participate in the module and individual sessions of the module				
None				
Recommended requirements				
None				
Allocation of the module (course / faculty)			Dental Technology / Faculty 16	
Usability of the module for other courses			-	
Availability			pro semester	
Length of the module			one semester	

Module Coordinator		Dr. Paul Weigl						
Proof of study /where applicable as exam preparation								
Proof of attendance		None						
Proof of work		None						
Teaching / Learning formats								
Lesson / Examination language		English / In the case of a purely German cohort: German						
Module examination		Format / Length / Contents where applicable						
Final module examination consisting of :		Practical Examination (graded), Length: 60 minutes (s. § 34 Para. 3.)						
Cumulative module examination consisting of:								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Digital Design and Planning	Seminar, Practical	8	x				
	Module examination	Practical examination	-	x				
	Total		8					

Module Description Case Documentation

Module 4/ CDOC	Case Documentation	Compulsory module	5 CP (insg.) = 150 h	
			Contact study 8 h in form of block sessions	Self-study 142 h
Contents				
<p>In the module “Case Documentation” the documentation of clinical cases will be explained and information provided about their significance before and after fitting medical restorations as well as their production process at professional standards. In this context the students will be trained on an application basis in diverse documentation methods (protocol, dental photography and video recording in 2D and 3D). In particular, modern methods of three dimensional medical imagery (CBCT, CT, MRT, 3D-surface scans etc.) enable the advantage of a “virtual” patient in the form of a digitalised 3D-representation of oral tissue and the face. The medical realisation of simulated treatment on the virtual patient allows the use of AR (Augmented Reality) or VR (Virtual Reality) glasses.</p>				
Learning outcomes /Competence objectives				
<p>The specialist competence of the student in respect of the orderly documentation of patient cases and in particular dentally produced restorations will improve through the practical usage of written and image processes (dental photography, video recording, mock-up, CBCT, CT, MRT, 3D-surface scans etc.). The objective is the personal documentation and evaluation of patient cases with integrated dentally produced restorations in line with current scientific standards.</p>				
Requirements to participate in the module and individual sessions of the module				
None				

Recommended requirements								
	None							
Allocation of the module (course / faculty)			Dental Technology / Faculty 16					
Usability of the module for other courses			-					
Availability			pro semester					
Length of the module			one semester					
Module Coordinator			Dr. Paul Weigl					
Proof of study /where applicable as exam preparation								
Proof of attendance			None					
Proof of work			None					
Teaching / Learning formats								
Lesson / Examination language			English / In the case of a purely German cohort: German					
Module examination			Format / length / contents where appropriate					
Final module examination consisting of:			Homework (graded), scope: 10 pages, Length: 8 weeks, Contents: Working a mock case					
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Case Documentation	Seminar, Practical	5	x				
	Module examination	Practical examination	-	x				
	Total		5					

Module description *Dental Technology – Patient Treatment Procedures for Dental Technicians*

Module 5/ PTPDT	Dental Technology – Patient Treatment Procedures for Dental Technicians	Compulsory module	8 CP (total) = 240 h	
			Contact study 24 h in the form of block sessions	Self - study 216 h
Contents				
<p>The students will be shown specific treatment procedural step for patients that can be delegated by dentists to dental technicians with corresponding training. These include non-invasive procedural steps of functional and aesthetic try-ins for dental produced restorations, adjusting the occlusion, determining the vertical and horizontal jaw relationship, implant abutment assembly and disassembly, determining the colour and soft tissue, the fitting of a face bow, conventional as well as digital tooth/jaw impression.</p> <p>The treatment steps will in addition to the theoretical presentation be demonstrated on patients and the students will be trained on a phantom.</p>				
Learning outcomes /Competence objectives				

After successful completion of the module the students will be able to perform non-invasive treatment steps directly on the patient. The objective is to significantly expand the field of work of the dental technician in that he is trained to be personally involved in the treatment of the patient. Before implementing this acquired skill and competence on the patient a legal clarification and approval must be obtained on a country by country basis.								
Requirements to participate in the module and individual sessions of the module								
Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science”								
Recommended requirements								
None								
Allocation of the module (course / faculty)	Dental Technology / Faculty 16							
Usability of the module for other courses	-							
Availability	pro semester							
Length of the module	one semester							
Module Coordinator	Prof. Dr. Robert Sader							
Proof of study /where applicable as exam preparation								
Proof of attendance	Regular attendance							
Proof of work	none							
Teaching / Learning formats								
Lesson / Examination language	English / In the case of a purely German cohort: German:							
Module examination								
Final module examination consisting of:	Format / length / contents where appropriate OSCE (graded), length: 30 minutes.							
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
				Semester				
	Lesson format	CP		1	2	3	4	5
	Dental Technology – Patient Treatment Procedures for Dental Technicians	Seminar, Practical	8		x			
	Module examination	OSCE	-		x			
	Total		8					

Module Description *Hygiene and Regulations*

Module 6/ HREG	Hygiene and Regulations	Compulsory module	5 CP (total) = 150 h	
			Contact study 8h in the form of block sessions	Self-study 142 h
Contents				
<p>The students learn about the significance and realisation of all the stringent and facultative necessary hygiene measures for the treatment of patients. The distinction will be made between treating a patient on a dentist chair in a dental technical environment and in a dental practice or clinic. Additionally the significance and fulfilment of the norms and laws (different by country) in respect of hygienic standards will be explained.</p> <p>Non-invasive therapy steps as explained in the module “Dental Technology – Patient Treatment Procedures for Dental Technicians” will be compared between two different working environments: the patient comes to the dental technical environment or the dental technician is present in a dental practice or clinic.</p>				

Learning outcomes /Competence objectives							
The students will be able to fulfil all hygienic standards for the implementation of dental therapy steps on the patient. They develop the competence to independently identify and implement country-specific norms and laws in respect of required hygienic standards and measures in their working environment.							
Requirements to participate in the module and individual sessions of the module							
Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science”							
Recommended requirements							
Module “Dental Technology – Patient Treatment Procedures for Dental Technicians”							
Allocation of the module (course / faculty)			Dental Technology / Faculty 16				
Usability of the module for other courses			-				
Availability			pro semester				
Length of the module			one semester				
Module Coordinator			Dr. Paul Weigl				
Proof of study /where applicable as exam preparation							
Proof of attendance			regulaär attendance				
Proof of work			none				
Teaching / Learning formats							
Lesson / Examination language			English / In the case of a purely German cohort: German				
Module examination			Format / length / contents where appropriate				
Final module examination consisting of:			Practical examination (graded), length: 30 minutes.				
Cumulative module examination consisting of :							
Establishing the grade by cumulative module examinations:							
	Lesson format	CP	Semester				
			1	2	3	4	5
Hygiene and Regulations	Seminar, Practical	5		x			
Module examination	Practical examination	-		x			
Total		5					

Module Description *Patient Handling*

Module 7/ PATH	Patient Handling	Compulsory module	5 CP (total) = 150 h		Weekly hours per semester
			Contact study 8h in form of block sessions	Self - study 142 h	
Contents					
<p>In the module “Patient Handling” the relationship of the dental technician to the patient is the focus. The students deal in this module with psychological and communication scientific approach that explains the relationship with each other is strongly characterised by information asymmetries and should be helpful for future non-invasive treatment steps.</p> <p>Furthermore communication with the patient is explained with regard to responsibilities within the overall therapy.</p>					

Learning outcomes /Competence objectives								
<p>The students acquire specific knowledge in a discipline outside dental technology. Through this they refine not only their methodical and theoretical awareness but gain insights into new contexts that is a productive complement to their dental-technological focus. The students gain greater intellectual flexibility. They acquire analytical skills to reflect critically on interdisciplinary correlations.</p> <p>The students acquire competences for a professional manner with patients by applying a structured and psychologically based conversation style before carrying out non-invasive therapy steps both when dealing with complications that arise during the therapy steps or afterwards as identified and taught in the module “Dental Technology – Patient Treatment Procedures for Dental Technicians“</p> <p>Scientifically based argumentation and the recognition of emotionally altered patients with exaggerated and unfulfilled therapy results are recognised by the students as essential prerequisites for a constantly serious interaction with patients. The students recognise the significance of patient communication for sustainable success for the treatment team of the dentist.</p>								
Requirements to participate in the module and individual sessions of the module								
Successful completion of the module “Dental Technology – Manufacturing, Digital Applications, Materials, Science”								
Recommended requirements								
“Dental Technology – Patient Treatment Procedures for Dental Technicians”								
Allocation of the module (course / faculty)				Dental Technology / Faculty 16				
Usability of the module for other courses				-				
Availability				pro semester				
Length of the module				one semester				
Module Coordinator				Dr. Paul Weigl				
Proof of study /where applicable as exam preparation								
Proof of attendance				Regular attendance				
Proof of work				none				
Teaching / Learning formats								
Lesson / Examination language				English / In the case of a purely German cohort: German				
Module examination				Format / length / contents where appropriate				
Final module examination consisting of :				Oral examination (graded), Length: 30 minutes.				
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Patient Handling	Seminar	5		x			
	Module examination	Oral examination	-		x			
	Total		5					

Module Description *Scientific Methods I*

Module 8/ SM1	Scientific Methods I	Compulsory module	5 CP (total) = 150 h	
			Contact study 16 h in form of block sessions	Self - study 134 h
Contents				
<p>The module is an introduction to scientific theory and provides knowledge about rules for good scientific work. The required structure, stylistic text design, quoting from literature and the absolute separation in content of describing methods from results required for writing a scientific piece of work will be taught.</p> <p>The structured search for literature as well as its acquisition and evaluation by using literature databases and the university library of the Goethe University are a further element of this module.</p> <p>An initial insight into the evaluation methods of biomedical statistics forms the basis for the discussion of different designs of in-vitro and in-vivo scientific studies carried out.</p>				
Learning outcomes /Competence objectives				
<p>The students will be able to carry out their own scientific work. Additionally knowledge in the field of scientific theory, good scientific practice, basic statistics and scientific writings are included. Beyond this, students become familiar with research possibilities and derive an initial insight into the area of clinical study design.</p> <p>After completion of the module the students are in the position to provide well-founded evaluations of scientific literature as well as interpreting clinical studies. Additionally they have improved their analytical and communicative abilities to make complex relationships transparent and to demonstrate them scientifically adequately.</p>				
Requirements to participate in the module and individual sessions of the module				
none				
Recommended requirements				
none				
Allocation of the module (course / faculty)			Dental Technology / Faculty 16	
Usability of the module for other courses			-	
Availability			pro semester	
Length of the module			one semester	
Module Coordinator			Dr. Paul Weigl	
Proof of study /where applicable as exam preparation				
Proof of attendance			none	
Proof of work			none	
Teaching / Learning formats				
Lesson / Examination language			English / In the case of a purely German cohort: German	
Module examination			Format / length / contents where appropriate	
Final module examination consisting of:			Homework (graded), scope: 10 pages, Length: 8 weeks	
Cumulative module examination consisting of :				

Establishing the grade by cumulative module examinations:							
	Lesson format	CP	Semester				
			1	2	3	4	5
Academic Methods I	Seminar	5		x			
Module examination	Homework	-		x			
Total		5					

Module Description *Process Management within a therapeutic team*

Module 9/ PMTT	Process Management within a therapeutic team	Compulsory module	5 CP (total) = 150 h		Weekly hours per semester
			Contact study 16h in form of block sessions	Self-study 134 h	
Contents					
<p>Building on the module “Dental Technology – Patient Treatment Procedures for Dental Technicians” a structured and efficient communication and the relationship with the leader of a team of therapists for the implementation of a complex multidisciplinary therapy will be taught.</p> <p>After identifying their own responsibilities and those of different therapists the students learn to know and apply the structured process to arrive at a consensus for a final therapeutic plan. This derives in particular from the scientifically based consideration of potential risks and expected benefits for the patient.</p> <p>Using case studies, an effective communication and reporting structure within the therapy team will be established as an important prerequisite for a complete realisation of the planned therapy results. Both the initial consensus agreement and the structured communication within the therapy team will be presented in detail as the basis for a functioning management of possible conflicts that might arise within the team and/or between the team and the patient.</p>					
Learning outcomes /Competence objectives					
<p>Students will be able to integrate on a sound scientific basis into an existing team comprising different medical/dental disciplines for a complex therapy and to independently identify and manage their own area of responsibility. Furthermore they are aware of the relevance of communication within the therapy team and are in the position to integrate communicatively into the team approach</p> <p>Competences in the field of professional project and personnel management will be acquired especially in the set-up and controlling of responsibility and communication structures, in the risk-benefit analysis and in conflict management.</p> <p>The objective is to enable graduates to contribute independently and expediently both from the subject matter as well as administratively within a complex multidisciplinary therapy team and to critically reflect on their own behaviour.</p>					
Requirements to participate in the module and individual sessions of the module					
Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science”, “Dental Technology – Patient Treatment Procedures for Dental Technicians”					
Recommended requirements					
Module “Patient Handling”					
Allocation of the module (course / faculty)			Dental Technology / Faculty 16		
Usability of the module for other courses			-		
Availability			pro semester		
Length of the module			one semester		
Module Coordinator			Prof. Dr. Robert Sader		
Proof of study /where applicable as exam preparation					

Proof of attendance	none
Proof of work	none
Teaching / Learning formats	
Lesson / Examination language	English / In the case of a purely German cohort: German
Module examination	Format / length / contents where appropriate
Final module examination consisting of:	Homework or video presentation (reflection)
Cumulative module examination consisting of :	
Establishing the grade by cumulative module examinations::	
	Semester
	1 2 3 4 5
Process Management within a therapeutic team	Lecture
Module examination	Homework
Total	5

Module Description *Anatomy, Physiology and Oral Diseases*

Module 10/APOD	Anatomy Physiology and Oral Diseases	Compulsory module	5 CP (total) = 150 h		Weekly hours per semester
			Contact study 16h in form of block sessions	Self-study 134 h	
Contents					
The anatomy of the masticatory organ and the facial structure are explained to the students both in theory and using human specimens. Based on this, physiological and cybernetic properties of the masticatory organ are taught. The students become familiar with the clinical appearance of orally manifested diseases.					
Learning outcomes /Competence objectives					
Despite the limitation on carrying out non-invasive therapeutic steps on patients, detailed anatomic knowledge about the masticatory organ and the face are an essential prerequisite for a patient focused cooperation between dental technology and dentistry. On conclusion of the module the students are in the position to analyse in detail the physiology and the cybernetic interaction of functional structures of the craniomandibular system and be able to transfer their knowledge targeted to the planning of dental technical restorations. Additionally competences will be acquired for diagnosing orally recognisable diseases in order to be able to communicate this in the case of a first diagnosis to the dental colleagues in the therapeutic team.					
Requirements to participate in the module and individual sessions of the module					
Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science” and “Dental Technology – Patient Treatment Procedures for Dental Technicians”					
Recommended requirements					
none					
Allocation of the module (course / faculty)			Dental Technology / Faculty 16		
Usability of the module for other courses			-		

Availability	pro semester						
Length of the module	one semester						
Module Coordinator	Dr. Paul Weigl						
Proof of study /where applicable as exam preparation							
Proof of attendance	Regular attendance						
Proof of work	none						
Teaching / Learning formats							
Lesson / Examination language	English / In the case of a purely German cohort: German						
Module examination	Format / length / contents where appropriate						
Final module examination consisting of:	Examination (graded), length: 60 minutes.						
Cumulative module examination consisting of :							
Establishing the grade by cumulative module examinations:							
			Semester				
	Lesson format	CP	1	2	3	4	5
	Anatomy Physiology and Oral Diseases	lecture	5		x		
	Module examination	examination	-		x		
	Total		5				

Module Description *Dental Technology – Chairside CAD/CAM Procedures*

Modul 11/ CCCP	Dental Technology – Chairside CAD/CAM Procedures	Compulsory module	5 CP (total) = 150 h		Weekly hours per semester
			Contact study 16h in form of block sessions	Self-study 134 h	
Contents					
<p>Students will become familiar with digital desktop devices which enable a completely digital work process up to the production of dental technical restorations on the dentist’s chair. The quality and performance will be critically analysed as well as their application in workshops with case studies.</p> <p>The proper handling, care and maintenance of digital desktop devices will be trained.</p> <p>Students will be advised of the possibilities and limitations of such CAD/CAM systems, in particular with regard to the limited choice of dental materials. Minimum quality standards for digitally based design processes will be developed to gain objective selection criteria for their application.</p>					
Learning outcomes /Competence objectives					
<p>On completion of the module the students are in the position of independently designing dental restorations with the help of corresponding digital desktop devices and with appropriate machine design aids (NC milling machines, 3D printers etc.) to produce them locally. They acquire the competence for an independent and objective selection of such desktop devices.</p> <p>Students can apply a structured risk-benefit analysis on a case by case to compare and evaluate using these devices with the conventional dental production of restorations especially under the aspect of a limited choice of useful dental materials.</p>					
Requirements to participate in the module and individual sessions of the module					
<p>Successful completion of the module “Dental Technology – Manufacturing, Digital Applications, Materials, Science”, “Dental Technology – Patient Treatment Procedures for Dental Technicians” and “Digital Design and Planning”</p>					

Recommended requirements								
none								
Allocation of the module (course / faculty)			Dental Technology / Faculty 16					
Usability of the module for other courses			-					
Availability			pro semester					
Length of the module			one semester					
Module Coordinator			Dr. Paul Weigl					
Proof of study /where applicable as exam preparation								
Proof of attendance			none					
Proof of work			none					
Teaching / Learning formats								
Lesson / Examination language			English / In the case of a purely German cohort: German					
Module examination			Format / length / contents where appropriate					
Final module examination consisting of:			Examination (graded), length: 60 minutes.					
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Dental Technology – Chairside CAD/CAM Procedures	seminar, practical	5			x		
	Module examination	examination	-			x		
	Total		5					

Module Description Scientific Methods II

Module 12/SM2	Scientific Methods II	Compulsory module	5 CP (total) = 150 h		Weekly hours per semester
			Contact study 16h in form of block sessions	Self study 134 h	
Contents					
<p>The module “Scientific Methods II“follows on from the module “Scientific Methods I“and teaches advanced knowledge in the area of scientific methods and applied biomedical statistics.</p> <p>Teaching focuses especially on the structured approach of a critical evaluation of the methods applied and the presentation of the result of scientific articles and textbooks. One important aspect – the identification and handling of errors in scientific publications – will receive special focus.</p> <p>The diverse ways and methods applied for carrying out a demanding scientific in-vitro or in-vivo study will be demonstrated using examples from the students will themselves be worked on.</p>					
Learning outcomes /Competence objectives					
<p>The students learn to develop complex areas of knowledge within specific issues in order to design learning and research processes themselves. They acquire research-oriented knowledge that supports priority setting with regard to the Master thesis. The students develop the competence to evaluate and select themselves the continuously increasing number of scientific articles and textbooks in this field based on objectifiable quality features. On completion of the module the students are in the position to deal adequately with scientific issues so as to design in-</p>					

<p>vitro or in-vivo studies and to write scientific papers.</p> <p>The students gain a deep understanding for the complex acquisition, planning and results evaluation of dental-technological applications with the aid of suitable scientific methods and develop an exceptionally reflective awareness for the range of research approaches and methodical competences.</p>																																						
Requirements to participate in the module and individual sessions of the module																																						
Successful completion of the module “Scientific Methods I“																																						
Recommended requirements																																						
none																																						
Allocation of the module (course / faculty)	Dental Technology / Faculty 16																																					
Usability of the module for other courses	-																																					
Availability	pro semester																																					
Length of the module	one semester																																					
Module Coordinator	Dr. Paul Weigl																																					
Proof of study /where applicable as exam preparation																																						
Proof of attendance	none																																					
Proof of work	none																																					
Teaching / Learning formats																																						
Lesson / Examination language	English / In the case of a purely German cohort: German																																					
Module examination	Format / length / contents where appropriate																																					
Final module examination consisting of :	Homework (graded), scope: 10 pages, length: 8 weeks																																					
Cumulative module examination consisting of :																																						
Establishing the grade by cumulative module examinations:																																						
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	Lesson format				CP	semester																																
		1	2	3		4	5																															
Academic Methods II	seminar	5																																				
Module examination	homework	-																																				
Total		5																																				

Module Description *Complex Workflows for Immediate Restorations on Implants*

Module 13/ CWIRI	Complex Workflows for Immediate Restorations on Implants	Compulsory module	9 CP (total) = 270 h		Weekly hours per semester
			Contact study 24h in form of block sessions	Self study 246 h	
Contents					
<p>Students will be taught the indications and clinical requirements for implants to fit immediately which in most cases enable a minimal invasive therapy.</p> <p>The challenges of working on a quick production of dental restorations for implants will be taught.</p> <p>Two digital continuous production processes for patients ‘specific abutments, as well as temporary and final restorations will be taught. A production process will use the digital desktop equipment described in the module “Dental Technology – Chairside CAD/CAM Procedures“. The second method deals with the virtual patient described</p>					

in detail in the module „Digital Design and Planning“ which with the aid of navigated inserted implants enables the production of abutments and temporary restorations prior to the implant. Both innovative digital workflows will be compared in respect of total investment, planning time, time in the chair, preparation time, therapy costs, radiation dose, reliability and quality.							
Learning outcomes /Competence objectives							
<p>Graduates are capable of transferring and applying their knowledge to the general advantages and disadvantages as well as the indications of patient – specific cases of implants supplied immediately.</p> <p>In this module students acquire the competence on a case by case basis to assess and in conclusion select the most appropriate production method for the immediate supply of patient-specific implant-abutments and the restorations attached to them for the immediate supply of implants.</p> <p>Furthermore the students learn to produce on virtual patients the abutments and restorations already prior to the implant insertion.</p>							
Requirements to participate in the module and individual sessions of the module							
Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science”, “Dental Technology – Patient Treatment Procedures for Dental Technicians” and “Digital Design and Planning”.							
Recommended requirements							
Module “Dental Technology – Chairside CAD/CAM Procedures”							
Allocation of the module (course / faculty)	Dental Technology / Faculty 16						
Usability of the module for other courses	-						
Availability	pro semester						
Length of the module	one semester						
Module Coordinator	Dr. Paul Weigl						
Proof of study /where applicable as exam preparation							
Proof of attendance	none						
Proof of work	none						
Teaching / Learning formats							
Lesson / Examination language	English / In the case of a purely German cohort: German						
Module examination	Format / length / contents where appropriate						
Final module examination consisting of:	examination (graded), length: 60 minutes.						
Cumulative module examination consisting of :							
Establishing the grade by cumulative module examinations:							
	Lesson format	CP	Semester				
			1	2	3	4	5
Complex Workflows for Immediate Restorations on Implants	lecture	9				x	
Module examination	examination	-				x	
Total		9					

Module Description *Quality Management*

Module 14/ QM	Quality Management	Compulsory module	5 CP (total) = 150 h					Weekly hours per semester
			Contact study 8h in form of block sessions	Self study 142 h				
Contents								
In the module “Quality Management“the organisational and regulatory requirements for a good and efficiently functioning dental business will be explained. This includes the identification of core processes, knowledge about methods of quality management, the definition of quality measures, quality assurance of externally purchased goods and/or services as well as the final quality assurance of the specific patient’s dental restoration.								
Learning outcomes /Competence objectives								
The objective is to furnish the graduates with additional knowledge in respect of a successful administrative and personnel structure in a dental business that enables an efficient and successful process and quality management. On completion of the module the students are in the position to determine, assess and implement the relevant regulatory requirements for their business. Additionally they are aware of the significance of an active risk prevention for the production of patients ‘specific medical products and are able to identify and minimise potential business risks.								
Requirements to participate in the module and individual sessions of the module								
none								
Recommended requirements								
Module “Hygiene and Regulations”								
Allocation of the module (course / faculty)			Dental Technology / Faculty 16					
Usability of the module for other courses			-					
Availability			pro semester					
Length of the module			one semester					
Module Coordinator			Dr. Paul Weigl					
Proof of study /where applicable as exam preparation								
Proof of attendance			none					
Proof of work			none					
Teaching / Learning formats								
Lesson / Examination language			English / In the case of a purely German cohort: German					
Module examination			Format / length / contents where appropriate					
Final module examination consisting of :			examination (graded), length: 60 minutes.					
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Quality Management	lecture	5				x	
	Module examination	examination	-				x	
	Total		5					

Module Description *Offering Consulting Services to Clinicians*

Module 15/ OCSC	Offering Consulting Services to Clinicians	Compulsory module	5 CP (total) = 150 h				
			Contact study 24h in form von block sessions	Self study 126 h			
Contents							
<p>In the module“Offering Consulting Services to Clinicians“ the students will be made aware of the possibilities of a potential further development of their existing business model in the form of consulting activities (Business Development). The target group for this kind of consulting consists mainly of clinics where there is a consulting need with regard to new production methods, and to see cost-benefit relationships for different types of dental restorations and identification of workflow optimisation potential. The subjects taught in the Master programme put students in the position of offering this consulting with a sound scientific basis.</p> <p>Offering consulting services demands excellent presentation skills that the students learn in this module.</p>							
Learning outcomes /Competence objectives							
<p>After completion of the module, the students are in the position of identifying and assessing potential further business areas in the consulting field. They develop the necessary skill set, to implement consulting work professionally and to present and communicate customised content. In this way students acquire specific knowledge in a discipline outside dental technology. They sharpen not only their awareness of methodology and theory but also gain insights into new contexts that expand their scientific horizon. The students gain a greater intellectual flexibility. They acquire the analytical skills to critically reflect on interdisciplinary connections.</p>							
Requirements to participate in the module and individual sessions of the module							
<p>Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science”, “Dental Technology – Patient Treatment Procedures for Dental Technicians” and “Digital Design and Planning”</p>							
Recommended requirements							
<p>Module “Dental Technology – Chairside CAD/CAM Procedures”</p>							
Allocation of the module (course / faculty)			Dental Technology / Faculty 16				
Usability of the module for other courses			-				
Availability			pro semester				
Length of the module			one semester				
Module Coordinator			Dr. Paul Weigl				
Proof of study /where applicable as exam preparation							
Proof of attendance			None				
Proof of work			None				
Teaching / Learning formats							
Lesson / Examination language			English / In the case of a purely German cohort: German				
Module examination			Format / length / contents where appropriate				
Final module examination consisting of :			Oral presentation (graded), length: 15 minutes.				
Cumulative module examination consisting of :							
Establishing the grade by cumulative module examinations:							
	Lesson format	CP	Semester				
			1	2	3	4	5
Offering Consulting Services to Clinicians	seminar	5				x	
Module examination	Oral presentation	-				x	
Total		5					

Module Description *Economic Lab Management*

Module 16/ ELM	Economic Lab Management	Compulsory module	5 CP (total) = 150 h				Weekly hours per semester	
			Contact study		Self study			
				8h in form of block sessions	142 h			
Contents								
<p>In the module“Economic Lab Management“business knowledge will be taught which should enable the students to improve the profitability of their dental business. For this reason contents from the areas of marketing and sales, process management and leadership will be taught.</p> <p>In addition to the business field developments discussed in the module “Offering Consulting Services to Clinicians“ the students will become familiar in this module with methods from the area of business development (Design Thinking, etc.) which should enable the students to develop further business models of their own.</p>								
Learning outcomes /Competence objectives								
<p>After completion of the module “Economic Lab Management“ the graduates develop the ability to see their laboratory from a business perspective and are therefore able to recognise and utilise the increase in profitability for their dental business. They will be further trained to identify and evaluate other business areas and to conclude newly developed business models. In this way their intellectual and analytical abilities are developed and they are able to identify and evaluate synergy potential between different disciplines.</p>								
Requirements to participate in the module and individual sessions of the module								
Successful completion of the module “Dental Technology – Patient Treatment Procedures for Dental Technicians”.								
Recommended requirements								
Module “Quality Management”.								
Allocation of the module (course / faculty)				Dental Technology / Faculty 16				
Usability of the module for other courses				-				
Availability				pro semester				
Length of the module				one semester				
Module Coordinator				Dr. Paul Weigl				
Proof of study /where applicable as exam preparation								
Proof of attendance				none				
Proof of work				none				
Teaching / Learning formats								
Lesson / Examination language				English / In the case of a purely German cohort: German				
Module examination				Format / length / contents where appropriate				
Final module examination consisting of :				Homework (graded), scope: 10 pages length: 8 weeks				
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Economic Lab Management	Lecture	5					x
	Module examination	homework	-					x
	Total		5					

Module Description *Manufacturing of Dental Restorations*

Module 17 / MODR	Manufacturing of Dental Restorations	Compulsory module	10 CP (total) = 300 h	
			Contact study 4h	Self study 296 h
Contents				
<p>The module envisages the independent construction of 10 dental restorations that take place in a practice or clinic without the specialist or methodical support of a local trainer.</p> <p>The following inserted dental restorations by a dentist on a real patient (pa) or on a phantom (ph) are to be performed:</p> <ul style="list-style-type: none"> a) 1 restoration with minimally evasive ceramic chips (pa) b) 1 restoration with veneers (total 1 to 6) (pa) c) 1 restoration with ceramic inlays (pa) d) 1 restoration with full ceramic single crown in the aesthetic zone (pa) e) 1 restoration with a three or four tiered bridge (ph or pa) f) 1 restoration with a fixed total reconstruction (ph or pa) g) 1 restoration with a complete reconstruction fixed to teeth and/or implants but removable (ph or pa) h) 3 restorations with a continuous digital production process (virtual patient, CAD-based construction, digital machine design (ph or pa). 				
Learning outcomes /Competence objectives				
<p>Improvement in the manual skills and competence for the application of conventional and consistent digital production processes will be achieved through an independent preparation of dental restorations. The objective is to develop a critically reflective professional operational competence.</p> <p>The competence for a professional clinical case documentation prepared independently with written and imaging procedures will be enhanced.</p>				
Requirements to participate in the module and individual sessions of the module				
Successful completion of the module “Case Documentation“				
Recommended requirements				
none				
Allocation of the module (course / faculty)			Dental Technology / Faculty 16	
Usability of the module for other courses			-	
Availability			Once pro semester	
Length of the module			Four semesters	
Module Coordinator			Prof. Dr. Robert Sader	
Proof of study /where applicable as exam preparation				
Proof of attendance			none	
Proof of work			none	
Teaching / Learning formats				
Lesson / Examination language			English / In the case of a purely German cohort: German	

Module examination			Format / length / contents where appropriate					
Final module examination consisting of:			Portfolio (graded) (written documentation of the required (10 cases)					
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Manufacturing of Dental Restorations	lecture	10					x
	Module examination	portfolio	-					x
	Total		10					

Module Description *Master Thesis*

Module 18/ MT	Master Thesis	Compulsory module	20 CP (total) = 600 h	
			Contact study	Self study 600 h
Contents				
<p>The Master thesis covers a subject from the area of dental technology that is literature based and is independently produced by the student using scientific methodology.</p> <p>The Master thesis can be based on a structured literature overview, an in-vitro study or a cell culture study. Further examples are clinical studies carried out as part of a therapeutic team , team- based new developments of materials, devices, production processes as well as the creation of an innovative scientifically evaluated service performance for members of the therapeutic team or for patients.</p>				
Learning outcomes /Competence objectives				
<p>The intensive and focussed analysis with a research subject chosen by themselves, the students expand their competent expertise to a high degree in a special area of dental technology. They learn to defend their theses and arguments, to react to critical questions and to take on suggestions in their work. The students are in the position of steering the learning and research process through targeted scientific-based decisions.</p>				
Requirements to participate in the module and individual sessions of the module				
<p>Successful completion of the modules “Dental Technology – Manufacturing, Digital Applications, Materials, Science”, “Dental Technology – Patient Treatment Procedures for Dental Technicians”, “Scientific Methods I” and “Scientific Methods II”.</p>				
Recommended requirements				
<p>Module “Complex Workflows for Immediate Restorations on Implants” and “Process Management within a therapeutic team”</p>				
Allocation of the module (course / faculty)			Dental Technology / Faculty 16	
Usability of the module for other courses			-	
Availability			pro semester	
Length of the module			one semester	
Module Coordinator			Dr. Paul Weigl	
Proof of study /where applicable as exam preparation				
Proof of attendance			none	

Proof of work			none					
Teaching / Learning formats								
Lesson / Examination language			Englisch / Im Falle einer rein deutschsprachigen Kohorte: Deutsch					
Module examination			Format / length / contents where appropriate					
Final module examination consisting of :			Master thesis (=final thesis , graded),scope: min. 25 pages, process time of 19 weeks with colloquium (ungraded, passes), length: 30 minutes					
Cumulative module examination consisting of :								
Establishing the grade by cumulative module examinations:								
		Lesson format	CP	Semester				
				1	2	3	4	5
	Master Thesis		19					x
	Colloquium		1					x
	Total		20					