

## LASERS IN DENTISTRY

*Master of Science in Lasers in Dentistry*

*Mastership & Fellowship Courses*

### PROFESSIONAL EDUCATION PROGRAMMES



THINKING THE FUTURE





**Prof. Dr. Norbert Gutknecht**

Scientific Director Lasers in Dentistry Programmes  
Clinic for Conservative Dentistry, Periodontology and Preventative Dentistry  
University Hospital Aachen, RWTH Aachen University

Laser technology is an essential tool for innovative dental practitioners wishing to treat their patients in a modern and effective manner. The specific properties of lasers enable new treatments and operating methods to be employed, as well as complementing and supporting existing therapeutic methods.

Patients are increasingly seeking alternative therapies, expecting their dentist to be well informed and to provide information regarding more gentle treatments. Through the use of laser technology, dentists can meet these expectations and provide patients with added benefits compared to more traditional methods.

Through science based educational training, innovative laser treatments can be correctly and successfully applied. The scientific theory, the biophysical interactions, as well as extensive theoretical and practical principles of laser dentistry, are not taught during initial dental degree programmes, making post-graduate education essential for specialization in these techniques.

For dentists wishing to specialize in specific laser wavelengths we offer several short mastership and fellowship courses. It is a measure of our success that a high percentage of our mastership students then go on to enrol in our M.Sc. programme and their success in the mastership or fellowship is credited towards the master course accordingly.

The master programme, M.Sc. in Lasers in Dentistry, has been developed in order to enable dentists to specialize in the full range of dental laser therapies. Building upon a first higher education degree in dentistry, this two-year modular master's course enables practicing dentists to specialize in dental laser applications by providing both theoretical and practical training.

We have been providing the M.Sc. in Lasers in Dentistry since 2004 and are proud that it is recognized and accredited in Germany and the European Union, as well as all countries that are signatories to the Washington Accord. Furthermore, the programme was awarded the bronze award for lifelong learning by the European Commission. This level of recognition has led to the course becoming an established force in dental medicine.

Approximately 150 dentists, from all over the world, have successfully graduated from our M.Sc. programme and, together with graduates from our mastership and fellowship courses, we are pleased to have a globally active alumni network.

Once again we look forward to welcoming highly motivated dentists wishing to benefit from this innovative technology.

Yours sincerely,

Prof. Dr. Norbert Gutknecht



Lasers have been used in dentistry for diagnostic and therapeutic purposes for more than 30 years, and are an indispensable instrument in any modern dental surgery. The use of lasers enables new treatment methods to be employed and lasers can meaningfully supplement more traditional therapies.

The use of lasers is associated with minimal contact, reduced vibration and pain, as well as a reduction in bleeding, leading to a more comfortable overall experience for the patient.

Lasers are highly versatile tools that can be successfully used in a wide range of applications in the treatment of mucous membranes, hard tooth structures and bones.

Additionally, the specific properties of lasers allow the development of radically new treatments and surgical techniques, and improvements in treatment success rates have been observed when lasers are applied.

Modern facilities and increased customer satisfaction help ensure the long-term financial success of any dental practice and, for these reasons, you should not miss the opportunity to expand and improve your range of treatments.

Lasers are primarily used in the following fields:

- Diagnosis: Caries detection
- Cariology: Caries removal, cavity preparation
- Endodontics: Reduction of germs in root canal dentine
- Implantology: Implant exposure, peri-implantitis therapy
- Surgery: Soft tissue and bone surgery
- Periodontology: Cleaning of the hard tissue surface and periodontal pockets
- Cosmetic treatments: Bleaching

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## INTRODUCTION

## BENEFITS

## APPLICATIONS

## STUDY PROGRAMMES

### PETER FAHLSTEDT, M.SC. (SWEDEN)

"I strongly recommend the education provided by AALZ at RWTH Aachen International Academy for some clear reasons. AALZ has more than 20 years of experience in Evidence Based Laser Supported Dentistry which is combined with the latest up-to-date knowledge. You can always expect the best and most efficient education, giving you all the tools positioned at the front line of laser dentistry. By joining the courses, you are connected to an international network your professional career cannot be without."



# MASTER OF SCIENCE IN LASERS IN DENTISTRY



## COURSE OBJECTIVES

The objective of the master programme, Lasers in Dentistry, is to enable dentists to treat patients with laser adjuvants and laser based therapeutic methods, as highly qualified specialists, and in a responsible manner.

The course balances the teaching of the medical aspects with extensive practical skill training on the dental application of laser systems. The close interdisciplinary cooperation between dentistry and physics is of significant importance in this field. In addition to teaching the latest research results, forward-looking problem solving to improve dental laser therapies is addressed.

After extending participants' basic knowledge in this subject area, the study goals focus on the transfer of specialist knowledge that is at the forefront of laser dentistry. Treatment methods, the planning and preparation of treatments, the systematic organization of scientific and clinical findings, as well as independent, responsible conduct, are of central importance.

The primary study goals and content of the master programme convey:

- An appreciation of the different optical models for the classification of light
- Knowledge of the physical principles and the technical implementation of a laser system
- An understanding of the dental principles associated with the application of laser systems of specific wavelengths
- The skill to employ dental laser systems in a clinically correct manner and in particular:
  - the safe and ethical application of lasers
  - the clinically indicated application of lasers under consideration of indications and contraindications for the given wavelengths
  - the supportive or independent role of lasers in therapy
  - recognised therapy plans and treatment protocols
- Competent and specialist patient consultancy in all areas of laser and laser supported therapy
- Critical assessment of scientific and clinical findings in the field of laser dentistry

## WHAT TO EXPECT

During the course you can expect the following:

- Use of different laser systems from leading manufacturers, covering all available wavelengths, during skill training sessions and practical exercises
- Live operations on patients or via direct monitor broadcasting
- Provision of all necessary organic materials and safety glasses for individual practice with lasers
- Meticulously compiled course documentation and additional specialist literature which serve as a future work of reference
- Encouragement to participate actively in international scientific congresses and to publish in scientific journals
- Independent access to a modern e-learning environment, supported by scientific staff

## DR. FAISAL TAMEEM ALJADIR, M.SC. (IRAQ)

"Prior to joining the master's program (Lasers in Dentistry), I had a general idea that a laser is only a cosmetic device in the dental practice... After the first lectures I began to discover the scientific basis of this tool and how it is mainly utilised to serve the patient during the treatment, minimize his pain and achieve superior results.

I really can say now that my presence in this programme, surrounded by the talented group of lecturers and the easy way in which the scientific materials were presented, was of great benefit to me. I learnt when and how exactly to apply the laser treatment to achieve a scientific, successful and long lasting treatment for my patients."



## COURSE DETAILS



This master programme is aimed at dental practitioners who want to train as specialists in laser dentistry and who wish to qualify with a highly recognized degree, while continuing with their career.

Participants must be approbated dentists with a minimum of two years of experience in a clinic or dental practice. Candidates who are not native speakers of English must provide appropriate proof of language qualification.

The range of applications for dental lasers continues to grow. By using innovative therapeutic methods you will be able to increase satisfaction levels amongst your customers and provide significant benefits compared to more traditional dental practices. Furthermore, you will be able to create new economic potential for your practice.

This career-accompanying course requires dentists to attend ten modules (38 days) over two years. These attendance modules are supplemented by e-learning enabling contact with the lecturers throughout the duration of the course. This mix of learning methods allows dental practitioners to balance their studies with their professional commitments.

Graduates are awarded the academic title "Master of Science" and, as such, are recognized as specialists in the field of laser therapy in dentistry. The awarding body is the RWTH Aachen University. Successful participants receive a total of 60 credit points in accordance with the European Credit Transfer and Accumulation System (ECTS). Graduates receive master diplomas in English and in German. An EU recognized diploma supplement is also provided.

For each module that is successfully completed training points for the German Federal Dental Association (Bundeszahnärztekammer) are awarded. A total of 466 training points are awarded during the two year programme. Furthermore, on completion of the appropriate training module, participants receive Laser Safety Officer (LSO) certification.

The M.Sc. in Lasers in Dentistry has been accredited by the accreditation agency, ASIIN e.V.. It is the first of its kind in Germany and the first worldwide accredited master programme in the field of laser dentistry. It is recognized in the EU, all countries of the Washington Accord and the Bologna-Reform as a national and internationally valid academic degree.

The course fee includes extensive course documentation, use of the e-learning platform, as well as a comprehensive extra-curricular programme including evening events, lunch and refreshments. Certificates and legalization (Apostille) of the master degree certificate for application abroad are also included. Additionally, the price covers RWTH Aachen University semester fees and "Semesterticket" (free use of public transport in the North Rhine Westphalia region) for the standard study period of four semesters.

Lectures as well as skill training sessions are held in the modern facilities of the Aachen Dental Laser Center and the University Hospital Aachen. The beautiful, historical city of Aachen, a UNESCO protected world heritage site, has evolved into a technology orientated European metropolis, located on the German-Dutch-Belgian border.

Course participants have access to scientific staff who are world-class experts in their specialised fields. Furthermore, the course attracts dentists from across the globe and participants are encouraged to network with their fellow students during numerous social events held throughout the course. Additional networking opportunities at international scientific conferences and through the alumni network, WALED, are also provided.

### YOUR PROFILE

### ENTRY REQUIREMENTS

### YOUR BENEFITS

### STUDY METHOD

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### M.SC.

### ADDITIONAL QUALIFICATIONS

### ACCREDITATION

### COURSE FEE

### LOCATION

### NETWORK

### DR. ILAY MADEN, M.SC. (TURKEY)

"The high standard of the education programme for lasers in dentistry, both academically and clinically, was the most impressive feature for me. Thanks to the broad spectrum of applications and their solid background, I can provide a better and more satisfying service to my patients. Being one of the early adaptors of the new technology has rewarded me with success and I recommend the same path to my colleagues."





- MODULE 1** Laser Safety and Optics  
In this first module an overview of the course is provided and the E-learning system, ILIAS, is introduced. The fundamentals of optics are taught and successful participants qualify as dental laser safety officers.
- MODULE 2** Dosimetry, Caries Fluorescence Diagnostics, Laser Physics and Literature Research  
The principles of fluorescence based caries diagnostics and dosimetry calculation are taught. The key subjects of laser technology are introduced and the foundations for the scientific master thesis are laid.
- MODULE 3** Erbium Laser  
An introduction to the physical and technical properties of Er:YAG and Er,Cr:YSGG lasers and their application is provided. Laser-tissue interactions for these wavelengths are also discussed. Skill training on models and patients is held.
- MODULE 4** Low-Level Laser Therapy, Medical Statistics I, Colloquium  
The technical-physical principles of low-level diode lasers are conveyed and skill training is conducted on models and patients. Medical statistics for the interpretation of preclinical and clinical results are introduced.
- MODULE 5** Diode Lasers, Photodynamic Therapy  
Participants learn the technical-physical principles of diode lasers and their application. The clinical indications of diode lasers are introduced and demonstrations as well as skill training and patient treatment are performed.
- MODULE 6** Nd:YAG Lasers  
Participants are familiarized with the principles of Nd:YAG lasers and their interaction with tissue is discussed. All relevant clinical indications of Nd:YAG lasers are introduced and applied in skill training on both models and patients.
- MODULE 7** CO<sub>2</sub> Lasers and Medical Statistics II  
The application of CO<sub>2</sub> lasers is presented. All relevant clinical indications of CO<sub>2</sub> lasers are introduced, demonstrated and then practiced. In medical statistics II the ability to assess preclinical and clinical results is extended.
- MODULE 8** Marketing and Colloquium  
A profound understanding of communication techniques appropriate for dental practice is provided, including patient acquisition through effective communication and marketing strategies.
- MODULE 9** Master Thesis  
Preparation and compilation of a master thesis on a laser dental topic, within a defined time frame, is required. Scientific and clinical results must be correctly incorporated.
- MODULE 10** Documentation of Clinical Case Studies  
Applying the principles learnt and training received in modules three to eight, patients are treated using approved treatment protocols in the participant's own practice.

## DR. UTE GLEISS, M.SC. (GERMANY)

"The master course not only met but greatly exceeded my expectations. Previously I could not have imagined that physics could be so exciting. Physics was taught excellently with infinite patience and in a friendly manner. We were supplied with any literature requested and care was taken during the practical training that no question was left unanswered. Although I now know how much work and dedication is required from the students during the course, I would readily tackle the challenge again!"



# COURSE STRUCTURE



- Attendance Required
- Home Study & E-Learning

## CURRICULUM

1ST ACADEMIC YEAR	MODULE 1 Laser Safety and Optics 5 days, 4 CP		
	Home Study & E-Learning		MODULE 10
	MODULE 2 Caries Diagn. & Laser Physics 5 days, 5 CP		Clinical treatments / Case documentation in your own practice
	Home Study & E-Learning		Home Study
	MODULE 3 Erbium Laser 5 days, 4 CP	MODULE 9	
	Home Study & E-Learning	Master Thesis Experiments / Research	
	MODULE 4 LLLT, Statistics, Symposium 5 days, 4 CP	Home Study, incl. use of the laboratory, 300 hrs. 10 CP	150 hrs. 5 CP
Home Study & E-Learning			
2ND ACADEMIC YEAR	MODULE 5 Diode Lasers & PDT 4 days, 3 CP	MODULE 9	MODULE 10
	Home Study & E-Learning	Master Thesis, Experiments / Research	Clinical treatments / Case documentation in your own practice
	MODULE 6 Nd: YAG Lasers 5 days, 4 CP		Home Study
	Home Study & E-Learning	Home Study, incl. use of the laboratory	
	MODULE 7 CO <sub>2</sub> Lasers, Statistics 4.5 days, 4 CP	300 hrs. 10 CP	150 hrs. 5 CP
	Home Study & E-Learning		
	MODULE 8 Marketing, Symposium 4 days, 2 CP		
Home Study & E-Learning			
FINAL EXAMINATION			

## PRINCIPAL LECTURERS



**Prof. Dr. Norbert Gutknecht** studied medicine and dentistry at the Universities of Bochum, Florence and Aachen. In 1995, following several research stays in the USA, focusing on dental laser therapy, he was awarded the Master in Application of Nd:YAG Lasers in Dentistry in Phoenix, AZ. In 1998 he was appointed Professor at the Department of Conservative Dentistry, Periodontology and Preventative Dentistry at RWTH Aachen University. Prof. Dr. Gutknecht is Director of the Aachen Dental Laser Center (AALZ) and Scientific Director of the M.Sc. in Lasers in Dentistry programme. Furthermore, he is the President of the German Society of Laser Dentistry (DGL) and an Executive Director of the World Federation for Laser Dentistry (WFLD).



**Prof. Dr. Matthias Frentzen** is Full Professor in Periodontology and Laser Research at the University of Bonn and is Vice Director of the Department of Periodontology, Operative & Preventive Dentistry, University Hospital Bonn. In 2006 he was appointed Co-Director of CEMBio (Center of Molecular Biotechnology, University of Bonn). Since 1988 he has served as the Head of the Laser Research Unit, and since 1994 as the Head of the Oral Biology Research Unit, at the university's Dental School. Prof. Dr. Frentzen is Secretary General of the German Society for Lasers in Dentistry and a founding member of the WFLD. His special research interests are related to laser diagnostics, the use of lasers in operative dentistry and periodontology, USPL and laser-tissue interaction.



**Prof. Dr. Ralf-Dieter Hilgers** studied mathematics at RWTH Aachen University. In 2001 was appointed Head of the Department of Medical Statistics (IMSA), RWTH Aachen University, providing biostatistical support for clinical and experimental trials. Professor Hilgers teaches students from different bio-scientific areas and is responsible for the education of investigators in clinical trials. Within the master programme he teaches medical statistics and provides consultation. His main methodological research areas are in the context of optimal design and randomization. Since 2001 his department has provided methodological support for 1647 research projects and published 249 papers in various areas of medicine.



**Prof. Dr. G. Lynn Powell** is the Founding Dean for the School of Dentistry and Chief of Dental Services at the University of Utah Health Sciences, USA. Dr. Powell has been Course Chairman for Fixed Prosthetics, Operative Dentistry and Dental Materials. He has been a clinical attending instructor in Restorative Dentistry, Occlusion and in the General Practice Residency program (GPR) and was promoted to a Professor in 1990. Dr. Powell's research interests include dental materials, infection control and dental lasers. He has published over 85-refereed articles and 80 abstracts, and holds 3 patents involving lasers in dentistry.



**Prof. Dr. Wolfgang Schulz** studied physics at Braunschweig University of Technology. In 1987 he joined the department of Laser Technology at RWTH Aachen University and received the Borchers Medal in recognition of his PhD thesis in 1992. In 1997 he joined the Fraunhofer Institute for Laser Technology in Aachen. Since 2005 he has represented the newly founded department of Nonlinear Dynamics of Laser Processing at RWTH Aachen University and is concurrently Head of the newly founded department of Modelling and Simulation at the Fraunhofer Institute for Laser Technology. Prof. Schulz's current work is focused on developing and improving laser systems and their industrial applications by combining mathematical, physical and experimental methods.



**Dr. René Franzen** studied physics at Düsseldorf University and completed his thesis in the Department for Laser Medicine. Since 2001 he has worked for RWTH Aachen University and the AALZ Aachen Dental Laser Center and is involved in teaching and research in the field of laser-supported dentistry. In 2003 he completed his PhD thesis for which he was awarded the RWTH prize for outstanding interdisciplinary research. Dr. Franzen teaches optics, laser technology, dosimetry and laser safety and is also responsible for running the AALZ's e-learning system.

# MASTERSHIP & FELLOWSHIP COURSES



One-year clinical specialization course for selected wavelengths

This programme is aimed at dentists who would like to specialize in certain wavelengths. Over the course of one year, participants are taught fundamental physical and technical knowledge and how to recognize primary, secondary, and tertiary indications.

The following wavelengths are taught:

- Er:YAG and Er,Cr:YSGG Lasers
- Diode Lasers and Photodynamic Therapy (PDT)

The course is divided into four modules requiring 12 days of attendance over a one year period.

Laser physics and laser safety including Laser Safety Officer certification  
Laser structure, function and handling: hands-on laser-tissue interactions

Er:YAG and Er,Cr:YSGG Lasers

- Theoretical background, clinical indications, skill training and demo treatments
- Biophysical background (absorption and transmission in various types of tissue)
- Clinically important for e.g. periodontics, implantology, endodontics, hard and soft-tissue surgery, cavity preparation and cariology

Diode Lasers and Photodynamic Therapy (PDT)

- Theoretical background, clinical indications, skill training and demo treatments
- Communication and application of suitable indications
- Clinically important for e.g. periodontics, implantology, endodontics and soft-tissue surgery

Written examination

Presentation of five clinical treatment cases

After successful completion of the course, participants receive a certificate from RWTH Aachen University identifying them as a dental laser specialist.

Aachen, Germany

Completion of the Mastership or Fellowship course may be credited towards modules three and five of the M.Sc. programme (see page 6 - 7).

## COURSE

## WAVELENGTHS

## COURSE STRUCTURE

### MODULE I (2 DAYS)

### MODULE II (4 DAYS)

### MODULE III (4 DAYS)

### MODULE IV (2 DAYS)

## CERTIFICATE

## LOCATION

## FURTHER STUDY OPTIONS

### DR. DIMITRIS STRAKAS, M.SC. (GREECE)

"The quality of the programme and its elaborate structure will certainly give you the boost that you need while using and successfully treating with lasers. I am grateful for all the things I have gained and for the security I feel having a great team of colleagues beside me, as we all walk with confident steps towards a new era of dentistry."



## PROGRAMME PARTNERS



RWTH Aachen University is one of Germany's elite universities and one of the most highly recognized technical universities in Europe. With 260 institutes within nine faculties, it is one of Europe's leading institutions for science and engineering research. With innumerable industrial cooperation partners, the education that students receive at RWTH Aachen University is firmly rooted in real-world applications. As a result, RWTH graduates are highly sought after by business and industry and one in five board members of German corporations is an alumnus of RWTH Aachen University.



As the central, executive education institute of RWTH Aachen University, the RWTH International Academy is able to call upon the expertise of the university's research institutes. Each of our executive education programmes is developed in conjunction with an RWTH Aachen institute. The institute nominates a scientific director and delivers the course in combination with lecturers from science and industry as appropriate. Hence, the RWTH International Academy is able to offer participants the opportunity to profit from the university's expertise in a practical manner.



Aachen Dental Laser Center

Since its founding in 1991, the Aachen Dental Laser Center, AALZ, has been the global leader in the field of dental laser education and dental laser training. With the AALZ the first educational institute for dental laser training was established at the Clinic for Conservative Dentistry, Periodontology and Preventative Dentistry at the RWTH Aachen University in Germany. It is renowned for its research in laser supported dentistry and cooperates with major research institutes both nationally and internationally.



World Academy for  
Laser Education in Dentistry

WALED, the World Academy for Laser Education & Research in Dentistry, is the Aachen Dental Laser Center's alumni club. Membership of this academy is exclusive to students, graduates and alumni of the Mastership/Fellowship and Master of Science (M.Sc.) in Lasers in Dentistry programmes run by the AALZ in conjunction with RWTH Aachen University. This academic and educational network was established to create an international academy of excellence for post-graduate education and research in laser dentistry. WALED hosts international symposia, as well as social meetings, and promotes collaboration amongst its members in the field of preclinical and clinical research and encourages the publication of clinical cases in scientific journals.



The German Society for Dental Laser Therapy (Deutsche Gesellschaft für Laserzahnheilkunde e.V., DGL) was founded in 1991 to promote the use of lasers in dental medicine and has been affiliated to the German Society for Dental and Oral Medicine (DGZMK) since 2005. With over 750 members the DGL is currently the largest and oldest European society of its kind. The DGL serves as a scientific platform for the presentation and discussion of scientific results in the field of laser dentistry. Colleagues have the opportunity to be kept informed of the latest developments and new applications as well as the limits of laser dentistry. The society's scientific and practitioner advisory boards issue recommendations and statements regarding the application of lasers in dental medicine. Furthermore, the society has developed a curriculum for certified training in laser dentistry.



## MASTERSHIP / FELLOWSHIP

Please send an application by e-mail to Mr. Vanweersch at the address provided below.

Leon Vanweersch, MBA | General Manager | Aachen Dental Laser Center  
Pauwelsstr. 17, 52074 Aachen | Germany  
Tel. +49 241 47571310  
Fax +49 241 47571329  
E-Mail: vanweersch@aalz.de

## APPLICATIONS



## MASTER OF SCIENCE IN LASERS IN DENTISTRY

Applications can be submitted by completing the online form, available online under [www.rwth-aachen.de/en/lasers](http://www.rwth-aachen.de/en/lasers), or by sending the application form to Mrs. Jacoby at the address given below.

During the application procedure the following documentation must also be submitted:

- Diploma and transcript of records
- A copy of your passport
- Curriculum Vitae
- Confirmation of a minimum of two years' work experience as a qualified dentist
- Proof of suitable health insurance cover
- Proof of English language ability (Test of English as Foreign Language – TOEFL Internet-based with a minimum score of 80 / TOEFL Paper-based with a minimum score of 550 / IELTS Test with a minimum score of 6.0 / Cambridge Test – Certificate of Advanced English)
- Signed course contract

Applications will be considered on a first come first served basis.

Verena Jacoby, M.A. | Programme Manager | RWTH International Academy  
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A full copy of our terms & conditions is available online under [www.academy.rwth-aachen.de](http://www.academy.rwth-aachen.de)

The information included in this brochure is correct at the time of going to press but may be subject to change without notice or liability.

Applicants' names and addresses will be entered into our database and may be used for the provision of information relating to similar courses.

## TERMS & CONDITIONS

**RWTH INTERNATIONAL ACADEMY**

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