



Certification Course

# AALZ/SFU Mastership Program Laser Therapy in Dentistry

## Course Syllabus



This document describes the syllabus, the contents and the goals of learning as well as the number of lecturing hours for the certification course:  
Mastership „Laser Therapy in Dentistry“

Last updated: 20. December 2022



# **Mastership Program in "Laser Therapy in Dentistry" (Certification Course)**

**Level of Qualification: Level 7 (Master)<sup>1</sup>**

**ECTS: 15 credit points**

The postgraduate mastership program „Laser Therapy in Dentistry“ is aimed at dentists who want keep pace with their patients’ wishes for innovative and gentle treatment methods.

In standard academic studies in dentistry, dentists have never learned about dental laser technology and treatment concepts. Building on a university degree in dentistry, the necessary professional knowledge for laser applications in dental practice is taught at the highest academic level in theoretical lectures and practical teaching for two selected wavelength areas - dental Erbium lasers and dental diode lasers.

Relevant theories and application options pertaining to laser use in dentistry are taught for those wavelengths. Participants obtain sound theoretical knowledge in lectures and seminars led by renowned, competent and experienced international scientists and practitioners. Skill training sessions, exercises, practical applications, and live operations guide participants towards using lasers successfully and professionally in their own treatments.

The modules of this mastership program are a subset of the SFU Sigmund Freud University Master Professional program „*Lasers in Dentistry*“ and qualify for an upgrade into that program if the participants so decides upon successful completion.

This program is offered through the SFU Sigmund Freud University and is conducted by AALZ Aachen Dental Laser Center.

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<sup>1</sup> Level of Qualification according to the European Qualification Framework (EQF)



## What the student can expect:

- Use of different Erbium and diode laser systems from leading manufacturers during skill training and practical exercises
- Practical instructions on laser handling
- Live operations directly on a patient or via direct monitor transfer
- Provision of all necessary organic materials and suitable laser safety goggles for guides practice with lasers
- Carefully documented working material serves as a sound reference work for everyday practice
- Training as a **certified Laser Safety Officer** is a part of the course
- Convenient learning environment due to own state-of-the-art seminar rooms
- Link-up to the scientific community: Participants attend international scientific congresses and are encouraged to issue in scientific publications



## Main content of the program

### Week 1 (4 days):

#### Module Laser Basics & Laser Safety Module Erbium Lasers

- Laser Basics & Physics
- Laser Tissue Interaction
- Absorption Law
- Laser Safety
- Laser Technique (Erbium lasers)
- Erbium Lasers - Er:YAG and Er,Cr:YSGG
- Evidence Based Procedures
- Scientific Background and Clinical Indications, Cariology, Cavity Preparation and Oral Surgery, Surface Modifications, Hard and Soft Tissue Surgery
- Skill Training (Hands-On)
- Patient Treatment (Demo)

### Week 2 (4 days):

#### Module Diode Lasers

- High Power Diode Lasers
- Scientific Background and Clinical Indications
- Evidence Based Procedures: Diode Laser-supported Endodontics & Periodontology, Oral Surgery
- Skill Training (Hands-On)
- Patient Treatment (Demo)

### Week 3

#### Module

#### Final Exams (3 days)

- Oral Exam (presentation of 5 patient Treatments with Diode or Erbium lasers)
- Graduation Ceremony at SFU Sigmund Freud University



# Curricular structure

<b>WEEK 1:</b>	<b>4 DAYS</b>
<b>MODULE &amp; MODULE</b>	<b>LSO  Erbium Lasers</b>

RESPONSIBLE: Franzen

LECTURERS: Franzen / Strakas / AALZ Faculty

## **COURSE DESCRIPTION:**

The first week (4 days of teaching) combines two modules. In these 5 days the modules **LSO** (Laser physics and Safety) and **Erbium Lasers** (Clinical Lectures) will be mixed into an alternating sequence of lectures about the fields of laser cavity preparation, cariology, basic laser physics, laser-tissue interaction, surgery and safety regulations, interceded with live patient demonstrations and hands-on training on dental Erbium laser systems.

The participant will be trained as a Laser Safety Officer (LSO) according to the standards EN60825.1, OStrV, or ANSI Z136, depending on the course language and location.

The **Erbium** module will cover the topic of evidence-based science for Erbium lasers in dentistry. The participant will learn how to operate Erbium laser systems. In the second part, specific Erbium laser light-tissue interactions will be discussed based upon the absorption Law. All relevant clinical indications for Erbium lasers will be presented and the applications demonstrated. Participants are observing during clinical treatments by a qualified faculty member. Finally, they will have train with these respective wavelengths.

## **COURSE GOALS:**

- Participants will become competent laser safety officers being aware of international regulation in order to prevent laser hazards during treatments.
- To learn and understand the biophysical interaction of laser irradiation of hard and soft tissue.
- To learn and understand the function of an Erbium laser to know how to operate Erbium laser systems.
- To learn how to treat patients with an Erbium laser according to the standardized treatment protocols.

## **COURSE OBJECTIVES**

- Knowledge
  - participants know the specific absorption behavior of Erbium laser radiation on hard and soft tissue as well as specific tissue formation.
  - participants will know all relevant clinical indications and whether they are adjunct laser treatments or independent laser treatments
  - participants know the different treatment protocols for adjunct laser treatments and as well as independent laser treatments
  - participants know how to apply an Erbium laser in an adequate way to a patient knowing all the specific power settings for the treatment protocol
  - Knowledge about simple biophysical light-tissue interactions and the possible hazards of laser radiation
  - to know about the technical construction of an Erbium laser and its different light guiding systems and pulse modes
  - to know about the physical processes of excitation and relaxation in Erbium based solid-state lasers
  - Theoretical knowledge of typical physical properties of Erbium lasers
  
- Skills
  - The participants are familiar with the safety regulations for the use of lasers in a dental office
  - The participants shall be able to demonstrate that she or he is able to handle a dental Erbium laser and its accessories in a responsible way.
  - The participants will study how to handle a dental Erbium laser and its accessories on different kind of tissue surfaces in order to understand the biophysical interactions
  - The participants will study how to handle a dental Erbium laser and its accessories on models and specifically prepared organic samples to practice the clinical treatments protocols for specific indications.
  - The participants will observe and assist laser treatments at various patients having different diseases.
  - The participants will train in skill training under the supervision of a qualified supervisor.

## **COURSE CONTENT (WEEK 1):**

- Introduction
- Cariology
- Laser Cavity Preparation
- Surgery
- Basic Physics
- Laser-Tissue Interaction & Absorption Law
- Laser Safety Regulations
- Live patient demonstrations
- Hands-On (Skill-Training)

**ASSESSMENT:**

A written exam of 60 minutes duration will be held at the end of the first week to pass the LSO qualification.

A written exam of 90 minutes duration will be held at the end of the first week to pass the Erbium laser module.

Both module exams must be minimum passed with sufficient (4,0). If the exam will not be passed, this exam part can be repeated twice.

**TECHNOLOGY/EQUIPMENT/MODELS/PHYSICAL SUPPORT**

- Lecture hall or seminar room
- Audio Visual Aids including wireless streaming of treatments to lecture halls
- Skill models / Skill lab
- Clinical treatment facilities

PLAN OF EDUCATIONAL METHODOLOGY TO BE USED	Lectures, e-learning, skill training, patient treatment (demonstrations)
COURSE PREREQUISITES / REQUIREMENTS	Degree in dentistry
WORKLOAD	Lectures LSO: 8 hours Self-Study time: 17 hours Total: 25 hours, 1 CP (ECTS)  Erbium Lasers lectures and skill-training: 32 hours Self-Study time: 93 hours Total: 125 hours, 5 CP (ECTS)

## **WEEK 2:**

**4 DAYS**

## **MODULE**

## **Diode Lasers**

RESPONSIBLE:

Strakas

LECTURERS:

Franzen / Strakas / AALZ Faculty

### **COURSE DESCRIPTION**

This module will cover the topic of diode lasers in dentistry. All relevant clinical indications for diode lasers will be presented and the applications demonstrated. Participants are observing during clinical treatments by a qualified faculty member.

Diode laser light-tissue interactions will be discussed. All relevant clinical indications for diode lasers will be presented and the applications demonstrated, with a focus on the fields of Endodontology, Periodontology and Surgery. Finally, they will have to train the therapy in skill training with these respective wavelengths.

### **OVERALL GOAL:**

To learn and understand the function of an diode laser system. To know how to operate diode laser systems and to understand the biophysical interaction of diode laser irradiation of tissue. To understand the use of diode lasers in all relevant clinical indications. To be able to handle diode lasers appropriately on tissue after completing a specified skill course. To understand the standardized treatment protocols for the various indications.

### **COURSE OBJECTIVES**

- Knowledge
  - Participants know the specific absorption behavior of diode laser radiation on hard and soft tissue as well as specific tissue formation.
  - Participants will know all relevant clinical indications and whether they are adjunct laser treatments or independent laser treatments
  - Participants know how to apply a diode laser in an adequate way to a patient knowing all the specific power settings for the treatment protocol
  
- Skills
  - The participants shall be able to demonstrate that she or he is able to handle a dental diode laser and its accessories in a responsible way.



- The participants will study how to handle a dental diode laser and its accessories on different kind of tissue surfaces in order to understand the biophysical interactions
- The participants will study how to handle a dental diode laser and its accessories on models and specifically prepared organic samples to practice the clinical treatments protocols for specific indications.
- The participants will observe and assist laser treatments at various patients having different diseases.
- The participants will train in skill training under the supervision of a qualified supervisor.

**COURSE CONTENT (WEEK 2):**

- Introduction
- Endodontology
- Periodontology
- Surgery
- Laser-Tissue Interaction & Absorption Law
- Live patient demonstrations
- Hands-On (Skill-Training)

**ASSESSMENT:**

A written exam of 90 minutes duration will be held at the end of the week.

The module exam must be minimum passed with sufficient (4,0). If the exam will not be passed, this exam part can be repeated twice.

**TECHNOLOGY/EQUIPMENT/MODELS/PHYSICAL SUPPORT**

- Lecture hall or seminar room
- Audio Visual Aids including wireless streaming of treatments to lecture halls
- Skill models / Skill lab
- Clinical treatment facilities

PLAN OF EDUCATIONAL METHODOLOGY TO BE USED	Lectures, e-learning, skill training, patient treatment (demonstrations)
COURSE PREREQUISITES / REQUIREMENTS	Participated in the first 2 modules (week 1)
WORKLOAD	Lectures and skill-training: 32 hours Self-Study time: 68 hours Total: 100 hours, 4 CP (ECTS)

## **WEEK 3:**

**3 DAYS**

## **MODULE**

## **Case Documentation and Final Exam**

RESPONSIBLE: Franzen

EXAMINERS: Franzen/Strakas

### **COURSE DESCRIPTION**

After being familiarized with the clinical aspects of dental lasers, the participants will document their own patients' treatments.

### **OVERALL GOAL:**

The participants will be able to document their clinical treatments using the knowledge and skills obtained in the previous modules. They will be able to demonstrate their ability to treat patients according to solid clinical indications of various dental laser systems.

### **COURSE OBJECTIVES**

- Knowledge
  - Guidelines for clinical case documentations as outlined in the document "Guidelines for Case Presentations" available in the e-learning system
- Skills
  - The participants will exercise to collect and to arrange all relevant clinical data, all clinical findings (pre-treatment, in treatment, post-treatment), photo documentations, x-ray findings and lab findings in a document
- Attitudes/Behavior
  - The participants are able to demonstrate that they have documented a safe and ethical use of dental lasers in their patient treatments conducted in the previous modules.
  - Documentations are done on a professional level.

### **COURSE CONTENT:**

- Compiling clinical case presentations
- Clinical treatments in a dental clinic
- Documentation of clinical cases

### **TECHNOLOGY/EQUIPMENT/MODELS/PHYSICAL SUPPORT**

- Lecture hall or seminar room
- Audio Visual Aids including wireless streaming of treatments to lecture halls
- Clinical treatment facilities

## MEASURABLE OUTCOME

The participant completes a document containing his or her clinical case documentations.

Five (5) clinical laser cases must be documented and presented. These should contain both hard and soft tissue procedures, ideally done with 2 different wavelengths.

These case presentations will be assessed in an oral exam of 20-30 minutes by an examiner(s) according to the guidelines for clinical case presentations that are detailed in the document *Guidelines for Cases Preparations*. This module exam must be minimum passed with sufficient (4,0). If the exam will not be passed, this exam part can be repeated once.

PLAN OF EDUCATIONAL METHODOLOGY TO BE USED	E-learning, Self-study
EXAMINATION	Oral exam of 20-30 minutes
WORKLOAD	Treatment in participant's own dental office and scientific documentation: approximately 125 hours  Total: 125 hours, 5 CP (ECTS)

## Assessment and assessment criteria for clinical case documentations

The treatment of a case must have been finished for a full documentation. For the case presentation the participant will have to present original pictures or photocopies or in digital form. X-rays have to be included in original or in copy.

These guidelines are in accordance with the requirements of the German Society for Laser Dentistry „DGL“ for acceptance of a case presentation on its scientific conferences.

The documentation of the case must contain the following documents:

1. **General medical anamnesis** risk factors and systemic diseases with a possible relationship to the present dental disease have to be shortly discussed.
2. **Dental Anamnesis**
3. **Clinic Finding:** The clinic finding must be complete. It includes all important singular diagnostic findings like caries, pocket depth etc.
4. **X-ray finding:** The x-ray documentation need to portrait all relevant findings.
5. **Photographic documentation:** The treated diseases which are not documented with x-rays have to be photographed. The participant will need to present photos of the initial status, a photo during treatment and at least one photo post treatment. Follow-up photos from recalls may further support the successful treatment.
6. **Diagnosis:** Diagnosis has to be in general as well as regarding the single teeth.
7. **Treatment plan:** With respect to the etiology, the findings and diagnosis and the treatment plan has to be documented.
8. **Laser parameters:** For the treatment with the laser the participant has to document at least the following data:
  - Operational mode (pulsed or cw)
  - Repetition rate
  - Pulse energy / Average Power
  - Fiber diameter or tip diameter or spotsize
  - Treatment duration
9. **Treatment:** Describe the treatment. Time stamps to illustrate the steps of the treatment have to be used.
10. **Finding after treatment:** The finial findings after the end of the treatment have to be documented. The success (or failure) of the treatment and the follow-up care are to be discussed in an epicrisis.

## RECOMMENDED REFERENCES

### **„Guidelines for Scientific Case Presentations“**

Published by the German Society for Laser Dentistry (Deutsche Gesellschaft für Laserzahnheilkunde, DGL e.V.)  
Head offices: Aachen, Germany  
DGL c/o Klinik für Zahnerhaltung  
Pauwelsstr. 30  
52074 Aachen  
Germany

(also available to participants in their e-learning system under the file name “Guidelines for Case Presentations”)

## RECOMMENDED TEXT AND REFERENCE BOOKS

### **Principles of Medical and Dental Lasers**

Author: Rene Franzen  
ISBN 978-1-4709-0592-7  
Lulu.com Publishing  
Raleigh, N.C., USA, 2011  
available at <http://www.lulu.com/spotlight/renefranz>

### **Lasertherapie in der zahnärztlichen Praxis: Die Anwendung unterschiedlicher Lasertypen in ihren jeweiligen Spezialgebieten (GERMAN LANGUAGE)**

Author: Norbert Gutknecht  
ISBN 978-3876527574  
Quintessenz Berlin, 1999

### **ANSI Z 136.1: American National Standard for the Safe Use of Lasers: ANSI Z-136.1**

American National Standards Institute,  
Laser Institute of America  
Orlando, FL, 2000.

### **“Proceedings of the 1st International Workshop of Evidence Based Dentistry on Lasers in Dentistry”**

ISBN 978-1-85097-167-2,  
Quintessenz Publishing Co. Ltd.,  
London, Berlin,  
Chicago 2007

### **German Regulation/OstrV**

(applies only to German language courses)

### **"Principles and Practice of Laser Dentistry",**

Author: Robert A. Convissar  
Mosby, ISBN 0323062067

### **"Oral Laser Therapy"**

Author: Andreas Moritz  
ISBN-13: 978-1850971504

**Clinical Periodontology and Implant Dentistry,**  
Author: Lindhe J.  
Munksgaard, Copenhagen 2008

**Essentials of dental radiography and radiology.**  
Author: Whaites E.  
Churchill, Livingstone 4th Ed. 2007  
ISBN 13: 978-0-443-10168-7

## **RECOMMENDED JOURNALS**

**Lasers in Dental Science**  
By Springer, London, UK

**Lasers in Medical Science**  
By Springer, London, UK

**Lasers in Surgery and Medicine**  
By Wiley, London, UK

**Photomedicine and Laser Surgery**  
By Liebert, New Rochelle, New York, USA

**Journal of Oral Laser Applications**  
Quintessence, London, UK

**Laser Journal**  
By Oemus, Jena, Germany

**Journal of Periodontology**  
Chicago, Illinois, USA

**Journal of Periodontal Research**  
By Cambridge Press

**Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics**  
Elsevier, New York, USA

**Journal of Endodontics**  
By Elsevier, New York, USA

**Journal of Clinical Periodontology**  
By Munksgaard, Kopenhagen, Denmark

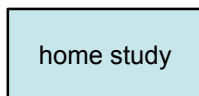
## Course plan of the certificate course „Laser Therapy in Dentistry“

### Legend



Module

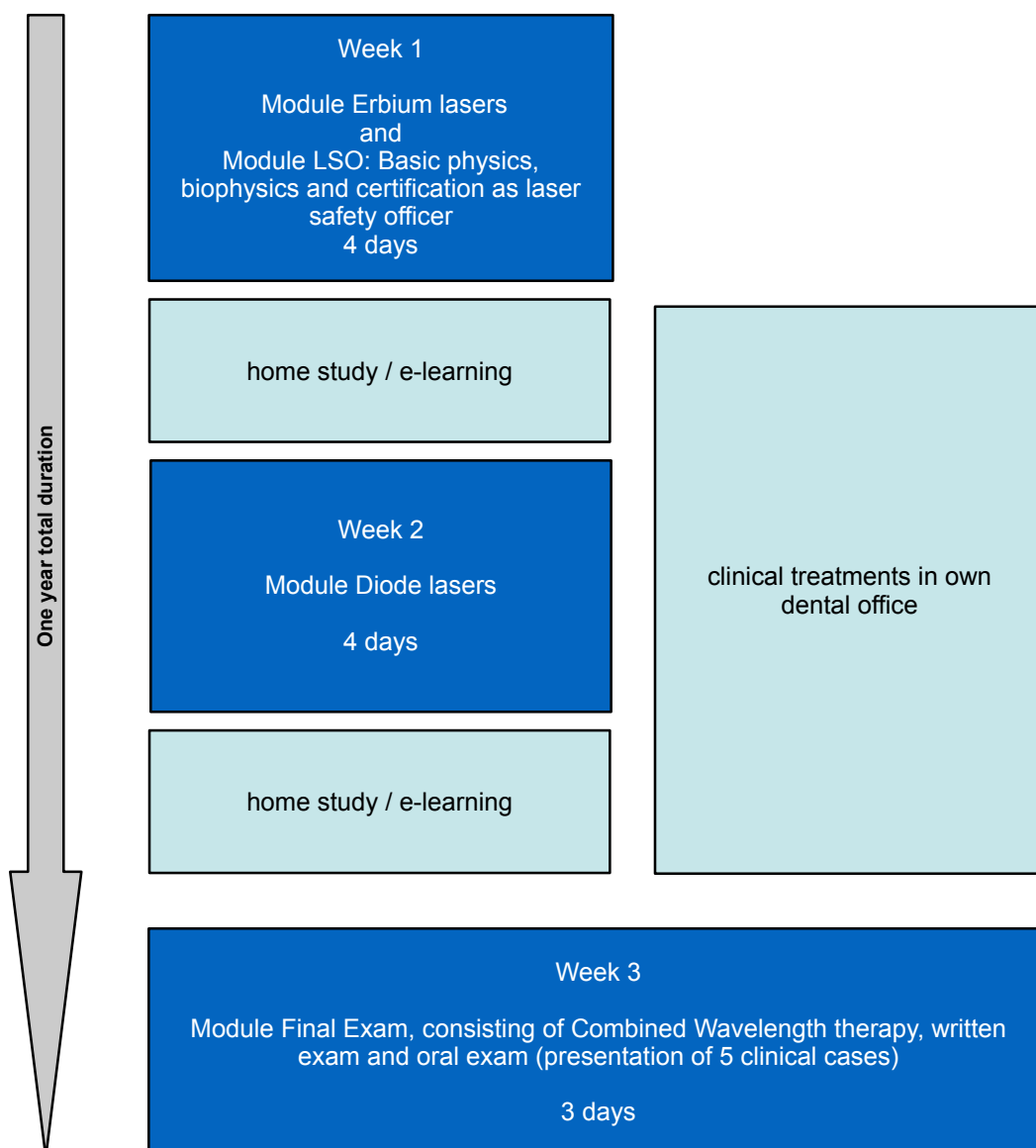
education on site \*)  
These parts are conducted in presence of the participants (lectures, seminars, skill training, patient demonstration)



home study

home study, supported by e-Learning \*)  
consolidation of knowledge and discussions in the e-learning system, study of journal articles in the e-learning database

\*) The size of the blocks is not drawn to scale.



# Sample schedules

Legend

LSO
Erbium
Diode
Other

## Week 1

TIME	DAY 1	DAY 2	DAY 3	DAY 4
09:00-10:00	LSO 1	LSO 2 (Erbium specific pulsing)	LSO 3	Erbium endodontics
10:00-13:00				Erbium surgery
13:00-14:00	Lunch	Lunch	Lunch	Lunch
14:00-16:00	Erbium cariology	Erbium devices & dosimetric examples	Erbium endodontics	Exams
16:00-18:00	Skill Training (Hands on)	Skill Training (Hands on)	Skill Training (Hands on)	Skill Training (Hands on)

## Week 2

TIME	DAY 1	DAY 2	DAY 3	DAY 4
09:00-10:00	Erbium & diode periodontics	Diode endodontics	PBMT PDT & aPDT	Prosthodontics
10:00-13:00				Orthodontics & common mistakes
13:00-14:00	Lunch	Lunch	Lunch	Lunch
14:00-16:00	Erbium implantology	Diode surgery	Diode bleaching (whitening)	Exams
16:00-18:00	Skill Training (Hands on)	Skill Training (Hands on)	Skill Training (Hands on)	Skill Training (Hands on)

## Week 3 - exam week

TIME	DAY 1	DAY 2	DAY 3
09:00-10:00	Introduction	Written Final Exam	
10:00-13:00	Registration & Exam Check In	Debriefing	Oral case exams
13:00-14:00	Lunch	Lunch	Lunch
14:00-16:00	Combined Wavelengths Therapy Options / Case reviews	Oral case exams	Oral case exams
16:00-18:00		Oral case exams	Certification ceremony





# Your faculty

## **Assoc.-Prof. Dr. rer. medic. Rene Franzen, Scientific Director - Physicist**

- 91 publications, 41 conference presentations, H-index 22, 3 patents
- Scientific Director AALZ
- previously Head of Preclinical Research and Education at AALZ Aachen Dental Laser Center GmbH
- Member of the Medical Faculty of RWTH Aachen University
- Scientific Advisory Board of DGL Deutsche Gesellschaft für Laserzahnheilkunde
- Editorial Board Lasers in Medical Science, Lasers in Dental Science, and Biomedicines
- Expert for Laser Safety for Dental Applications (OStrV, TROS, IEC & EN60825.1)
- responsible for AALZ e-Learning
- responsible for a project for establishing and maintaining a e-learning system for the international post-doctoral master programme "Master in Lasers in Dentistry" (M.Sc.)
- responsible for quality and academic management in the master programme "Master in Lasers in Dentistry" (M.Sc.)
- involved with development for M.Sc. curricula in dentistry, responsible for ECTS calculations and involved with accreditation of master programs

## **Dr. Dimitris Strakas, PhD MSc Scientific Director - Dentist**

- 34 publications, 52 conference presentations, H-index 6, 5 books
- Scientific Director AALZ
- Head Dental Laser Clinic in Aristotle University of Thessaloniki
- University Scholar at the Operative Dentistry Department in Aristotle University of Thessaloniki
- Visiting Professor in MISR University Cairo, Egypt
- M.Sc. in Lasers in Dentistry at RWTH Aachen University (2006)
- PhD in Aristotle University of Thessaloniki (2017)
- General Secretary International Society for Laser Dentistry (ISLD)
- Vice-President Hellenic Laser Dentistry Society (HALD)
- Organizing Chairman and Co-chairman in 3 Laser Dentistry World Congresses (Thessaloniki 2017, Aachen 2018, Cairo 2022)
- Associate Editor of Lasers in Dental Science (LIDS)



- Venia Legendi, Priv.-Doz. (RWTH Aachen University)
- Dr. rer. medic. (RWTH Aachen University)
- Dipl.-Phys. (HHU Düsseldorf University)



- Master of Science (RWTH Aachen University)
- PhD (Aristotle University of Thessaloniki)