

## EMDOLA Education Program

- Module 1: Optics
- Module 2: Physics of lasers
- Module 3: Interaction laser-tissues
- Module 4: Laser Safety and Properties of lasers
- Module 5: Lasers conservative dentistry and Laser in caries prevention
- Module 6: Lasers and endodontics
- Module 7: Laser in Oral Surgery ; Periodontics and Implantology
- Module 8: Low-Level Laser Therapy ; Jurisprudence and Practice Management
- Module 9 : Master Thesis (research in labs; redaction of paper to publish, MT defense)
- Module 10: Clinical training (University hospitals)

## EMDOLA Education Program: First Year Details

1

Optics

History of lasers:

- Laser history, lasers in medicine,
- Lasers in dentistry, lasers in science, ...

Optics data :

- Introduction
- Origins
- Optics in the 17th, 18th, 19th centuries and today
- Geometrical optics
- The field concept
- Mathematical formulation of the electromagnetic phenomenon
- Diffraction, reflection, interference

The quantum nature of the light:

- Black bodies radiation
- The light wave/particle dualism
- The photoelectric effect
- Absorption and emission

Medical statistics  
 Scientific literature  
 SAS workshop  
 Statistical methods  
 E-Learning

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| 2 | Physics of lasers   | <p>the Fabry-Perot interferometer</p> <p>Laser:</p> <ul style="list-style-type: none"> <li>- The light amplifying</li> <li>- Physical properties of lasers</li> <li>- Ultra-short pulses production</li> </ul> <p>Dosimetry:</p> <ul style="list-style-type: none"> <li>- Irradiation parameters</li> <li>- Emission mode profiles</li> </ul>  |
| 3 | Interaction laser-tissues   | <p>Interaction laser-tissues in a physical point of vue:</p> <ul style="list-style-type: none"> <li>- Optical properties of biologic tissues</li> <li>- Light absorption in water</li> <li>- Light absorption in hydroxyapatite</li> <li>- Linear and non-linear interaction</li> </ul> <p>Processes:</p> <ul style="list-style-type: none"> <li>- Coagulation, vaporization, ablation, disruption, etc.</li> </ul> <p>Interaction laser-tissues in a biological point of vue:</p> <ul style="list-style-type: none"> <li>- Ablation, disruption, etc.</li> <li>- Light absorption in hydroxyapatite</li> <li>- Light absorption in melanin, hemoglobin, proteins, etc.</li> <li>- Thermal side effects</li> <li>- Influence of some parameters on the laser efficiency</li> </ul> |
| 4 | Laser Safety and Properties of lasers and their applications in dentistry | <p>Laser safety and law requirements</p> <p>Laser handling:</p> <ul style="list-style-type: none"> <li>- Light guidance principles</li> <li>- Transmission systems and their diversity</li> </ul> <p>Construction, function, properties of laser, systems in dentistry and their clinical applications:</p> <ul style="list-style-type: none"> <li>- Er-YAG and ErCr:YSGG lasers (2940 and 2780 nm)</li> </ul>   |

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|   |  | <ul style="list-style-type: none"> <li>- Nd-YAG laser (1064 nm)</li> <li>- Ho-YAG laser ( 2100 nm)</li> <li>- Nd-YAP laser</li> <li>- Alexandrite laser ( 755 nm)</li> <li>- He-Ne laser (632 nm)</li> <li>- Argon-ion laser (488 and 514 nm)</li> <li>- CO2 laser (9600 and 10600 nm)</li> <li>- Diode lasers ( 808 and 980 nm)</li> </ul>   |
| 5 | Lasers conservative dentistry and Laser in caries prevention | <p>Lasers, caries diagnosis and prevention:</p> <ul style="list-style-type: none"> <li>- General aspects of caries diagnosis and prevention</li> <li>- State of the research</li> <li>- Laser, enamel, dentine and fluoride</li> <li>- Laser fluorescence, laser spectroscopy</li> <li>- How to choose the adapted wavelength</li> </ul> <p>Laser, cavity preparations, carious treatments:</p> <ul style="list-style-type: none"> <li>- General aspects and state of the art in the field of cavity preparations</li> <li>- Enamel preparations, dentin preparations</li> <li>- Adhesion to ...</li> </ul> <p>Pulp capping:</p> <ul style="list-style-type: none"> <li>- Treatment modalities</li> <li>- How to choose the adapted wavelength</li> </ul> <p>Lasers in dental laboratories<br/>Laser bleaching<br/>PAD (Photo Activated disinfection)</p> |
| 6 | Lasers and endodontics                                       | <ul style="list-style-type: none"> <li>- General principles and state of the art on endodontic treatments</li> <li>- Endodontic microbiology and lasers</li> <li>- Laser and smear layer</li> <li>- Laser, root canal filling, root canal re-treatment</li> <li>- How to choose the adapted wavelength</li> </ul>   |
| 7 | Laser in Oral Surgery and Periodontics and Implantology      | <p>Lasers and periodontics:</p> <ul style="list-style-type: none"> <li>- General aspects and state of the art in periodontology (diagnosis, treatments)</li> <li>- Periodontal microbiology</li> <li>- Lasers and periodontal treatments (soft tissues, hard tissues [cement, bone defects])</li> </ul>   |

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|   |   | <ul style="list-style-type: none"> <li>- Indications, contra indications</li> <li>- How to choose the adapted wavelength</li> </ul>   |
|   |   | <p>Lasers, oral pathology, oral surgery:</p> <ul style="list-style-type: none"> <li>- General aspects and state of the art (soft tissues, hard tissues)</li> <li>- Indications, contra indications on the use of lasers in oral surgery</li> <li>- How to choose the adapted wavelength</li> </ul>                                    |
| 8 | Low-Level Laser Therapy and Jurisprudence and Practice Management | <p>Low-level laser therapy:</p> <ul style="list-style-type: none"> <li>- Biological response</li> <li>- Diagnosis with non thermal laser</li> <li>- Indications, contra indications</li> <li>- Laser analgesia</li> <li>- Laser acupuncture</li> </ul> <p>Jurisprudence<br/>Ethics<br/>Practice management<br/>Practice marketing</p> |

| <u>EMDOLA Education Program: Second Year Details</u> |                   |   |
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| 9  | Master Thesis     | <p>Draw up of the master thesis<br/>Guideline analysis and discussion<br/>Literature research, selection and analysis<br/>Rules to be followed in a laboratory<br/>Research work<br/>Evaluation criteria<br/>Analysis<br/>Conclusion<br/>Presentation of the MT<br/>MT defense</p>                |
| 10   | Clinical training | <p>Clinical training on patients</p> <p>Students must present six to ten clinical observations in different fields of oral lasers applications.</p> <p>Discussion is based on the clinical cases, the quality of the documents, the treatment plan the methodology followed and the follow-up</p> |

