



8671

DESIGN AND FABRICATION
OF DENTAL CERAMIC
RESTORATIONS (12D)

40S/40E/40M

A Dental Technology Course

8671: DESIGN AND FABRICATION OF DENTAL CERAMIC RESTORATIONS (12D) 40S/40E/40M

Course Description

Studies in this course progress into advanced all-ceramic restorations and multiple-unit restorations. This area also incorporates computer-aided design/computer-aided manufacturing (CAD/CAM) technology in design and milling techniques.

Goal 1: Describe and apply appropriate **health and safety** practices as they relate to dental technology.

GLO 1.1: Create and maintain a **safe working environment** in a dental laboratory.

- SLO 12D.1.1.1: Demonstrate safe work procedures related to equipment, tools, and materials associated with the fabrication of ceramic restorations.
 - SLO 12D.1.1.2: Demonstrate the ability to identify and report potential hazards in the fabrication of ceramic restorations.
 - SLO 12D.1.1.3: Demonstrate the appropriate use of personal protective equipment (PPE), such as goggles, face masks, vinyl gloves, and laboratory coats.
 - SLO 12D.1.1.4: Demonstrate the ability to identify worn, defective, and expired PPE and safety equipment.
 - SLO 12D.1.1.5: Describe knowledge of safety equipment, such as a fire extinguisher, a first aid kit, and an eyewash station.
 - SLO 12D.1.1.6: Demonstrate the safe use of rotary tools and lathes in the fabrication of ceramic restorations.
 - SLO 12D.1.1.7: Demonstrate the safe use of sharp tools, such as scalpels and carving instruments.
 - SLO 12D.1.1.8: Demonstrate and use infection-control techniques and apply universal safety precautions to prevent cross-contamination in a laboratory environment.
 - SLO 12D.1.1.9: Demonstrate the safe use of Bunsen burners and alcohol torches.
 - SLO 12D.1.1.10: Discuss workplace health and safety.
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Goal 2: Demonstrate the safe and appropriate **operation, cleaning, maintenance, management, handling, and storage** of **equipment, tools, and materials**.

GLO 2.1: Demonstrate the safe and appropriate **operation** of **equipment and tools**.

SLO 12D.2.1.1: Demonstrate safe work procedures and the appropriate operation of equipment and tools associated with the design and fabrication of ceramic appliances.

GLO 2.2: Demonstrate the safe and appropriate **cleaning, maintenance, and management** of **equipment and tools**.

SLO 12D.2.2.1: Demonstrate the appropriate cleaning, maintenance, and management of equipment and tools associated with the design and fabrication of ceramic restorations.

GLO 2.3: Demonstrate the safe and appropriate **handling and storage** of restorative dental **materials**.

SLO 12D.2.3.1: Demonstrate the appropriate handling and storage of restorative dental materials associated with the design and fabrication of ceramic restorations.

Goal 3: Demonstrate an understanding of the **science and characteristics** of various **restorative dental materials**.

GLO 3.1: Demonstrate an understanding of the **science and characteristics** of various **restorative dental materials**.

SLO 12D.3.1.1: Demonstrate an understanding of the physical characteristics and appropriate use of various ceramic materials associated with dental restorations.

SLO 12D.3.1.2: Demonstrate an understanding of the chemical characteristics and appropriate use of various stains and ceramic materials associated with dental restorations.

SLO 12.3.1.3: Demonstrate an understanding of the mechanical characteristics and appropriate use of various ceramic materials associated with dental restorations.

GLO 3.2 Demonstrate an understanding of **metallurgy and the characteristics of acrylics** used in dental appliances.

- SLO 12D.3.2.1: Demonstrate the handling and manipulation of ceramic materials used in the design and fabrication of ceramic restorations.
- SLO 12D.3.2.2: Demonstrate an understanding of the structures of ceramic materials, fusing points, and layering effects associated with ceramic technology.
- SLO 12D.3.2.3: Demonstrate an understanding of organic and inorganic elements in ceramic materials.
- SLO 12D.3.2.4: Demonstrate an understanding of shear strength and yield strength in all-ceramic restorations.
- SLO 12D.3.2.5: Demonstrate and describe the coefficient of thermal expansion as it applies to ceramic fusing techniques.

Goal 4: Demonstrate the **functional design** of dental appliances.

GLO 4.1: Demonstrate the **functional design** of dental appliances.

- SLO 12D.4.1.1: Demonstrate an understanding of the importance of proper application of opaque, dentin, and enamel in multiple-unit restorations.
- SLO 12D.4.1.2: Demonstrate an understanding of the principles of functional design and their application to multiple-unit ceramic bridges.
- SLO 12D.4.1.3: Demonstrate an understanding of the importance of proper functional design in all-ceramic restorations.
- SLO 12D.4.1.4: Demonstrate an understanding of the use of computer-aided design and computer-aided manufacturing (CAD/CAM) technology in designing and milling a dental restoration.

Goal 5: Demonstrate the **fabrication** of dental appliances.

GLO 5.1: Demonstrate the **fabrication of the components** used in dental appliances.

- SLO 12D.5.1.1: Demonstrate the design and anatomical adaptation of ceramic material, using stones and burs.
 - SLO 12D.5.1.2: Demonstrate the application of ceramics on multiple-unit substructures.
 - SLO 12D.5.1.3: Demonstrate the design of porcelain margins.
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GLO 5.2: Demonstrate the **fabrication** of dental appliances from their various components.

SLO 12D.5.2.1: Demonstrate the use of ceramics and their application to multiple-unit substructures.

SLO 12D.5.2.2: Demonstrate the adjusting, shaping, staining, and glazing of ceramic dental appliances.

SLO 12D.5.2.3: Demonstrate the fabrication of all-ceramic inlay and onlay restorations.

SLO 12D.5.2.4: Demonstrate the fabrication of anterior all-ceramic restorations.

SLO 12D.5.2.5: Demonstrate CAD/CAM scanning and design of posterior restorations.

SLO 12D.5.2.6: Demonstrate CAD/CAM scanning and design of anterior restorations.

SLO 12D.5.2.7: Demonstrate CAD/CAM scanning of multiple-unit restorations, including implant abutments.

Goal 6: Demonstrate the **repair and adjustment** of dental appliances.

GLO 6.1: Demonstrate an awareness of **problems** associated with dental appliances.

SLO 12D.6.1.1: Demonstrate knowledge of limitations associated with ceramic material and its durability.

GLO 6.2: Repair dental appliances.

SLO 12D.6.2.1: Demonstrate knowledge of soldering substructures with semi-precious alloys, using powder metal.

SLO 12D.6.2.2: Demonstrate knowledge of opaque and ceramic repair of restorations.

SLO 12D.6.2.3: Demonstrate the adjustment of stains and glazing.

GLO 6.3: Adjust dental appliances.

SLO 12D.6.3.1: Demonstrate the adjustment and replacement of ceramic restorations.

Goal 7: Describe and demonstrate transferable **cross-curricular knowledge and skills** as they relate to dental technology.

GLO 7.1: Read, interpret, and communicate information related to dental technology.

SLO 12D.7.1.1: Read, interpret, and communicate information and terminology related to dental technology and advanced ceramics and CAD/CAM technology.

GLO 7.2: Apply knowledge and skills related to dental technology from **mathematics**.

SLO 12D.7.2.1: Convert between imperial and metric systems of measurement.

SLO 12D.7.2.2: Calculate and apply volume, weights, measurements, temperatures, and ratios.

GLO 7.3: Apply knowledge and skills related to dental technology from **anatomy and physiology**.

SLO 12D.7.3.1: Identify and describe halo effects, translucency, transparency, maverick deposits, and horizontal and vertical check lines.

SLO 12D.7.3.2: Locate, identify, and describe the lingual anatomical points, including the cingulum and the Carabelli cusp.

GLO 7.4: Apply knowledge and skills related to dental technology from **physics**.

SLO 12D.7.4.1: Demonstrate an awareness of the gothic arch with regard to mandibular movements.

SLO 12D.7.4.2: Demonstrate an awareness of centric stops and occlusion.

SLO 12D.7.4.3: Demonstrate an awareness of fulcrum application to long-span bridge design.

GLO 7.5: Apply knowledge and skills related to dental technology from **other subject areas** (art, physical education/health education, information and communication technology, social studies).

SLO 12D.7.5.1: Demonstrate an understanding of the psychological factors associated with bruxism (teeth clenching and grinding).

SLO 12D.7.5.2: Read, interpret, and demonstrate an understanding of information about the science of colour and shade taking associated with dental technology.

Goal 8: Demonstrate an understanding of **career opportunities** in dental technology.

GLO 8.1: Describe **education and career opportunities** and **professional organizations** in dental technology and associated fields.

SLO 12D.8.1.1: Demonstrate knowledge of and discuss the range of career opportunities in the dental and health professions and the post-secondary education and advanced training required for these professions.

Goal 9: Demonstrate an awareness of **sustainability** as it pertains to dental technology.

GLO 9.1: Describe the impact of **sustainability** on the **health and well-being** of dental technologists and their clients.

SLO 12D.9.1.1: Discuss practices that promote long-term health and well-being for dental technologists.

GLO 9.2: Describe the dental technology industry's **sustainability practices** and their impact on the **environment**.

No applicable SLOs.

GLO 9.3: Describe **sustainable business practices** within dental technology.

SLO 12D.9.3.1: Discuss the need for affordable dental appliances, alternative materials, and adaptability to changing markets and economic trends.

Goal 10: Demonstrate an awareness of **ethical and legal standards** as they pertain to dental technology.

GLO 10.1: Practise **ethical and legal standards** as they pertain to dental technology.

No applicable SLOs.

Goal 11: Demonstrate **employability skills** related to dental technology.

GLO 11.1: Demonstrate **fundamental employability skills**.

SLO 12D.11.1.1: Demonstrate initiative in performing and completing tasks.

GLO 11.2: Demonstrate an understanding of the **business operation** of a dental laboratory.

No applicable SLOs.

Goal 12: Demonstrate an understanding of the **evolution** of dental technology, including its **progression** and **emerging trends**.

GLO 12.1: Describe the **evolution** of dental technology, including its **progression** and **emerging trends**.

SLO 12D.12.1.1: Discuss the evolution of dental ceramic technology and CAD/CAM technology, including their progression and emerging trends.
