Content of practical classes on the discipline
«3D SIMULATION AND NANOMATERIALS IN DENTISTRY»
FOR FIRST-YEAR STUDENTS
of THE FACULTY of DENTISTRY
2st SEMESTER OF THE 2024/2025 ACADEMIC YEAR

Topic 1. 3D simulation. Basics of strength of materials. Digital Dentiя

Lesson № 1

Topic: « Basics of 3D simulation: creation of simple 2D sketches and 3D models»

1. Introduction to the interface of the 3D modeling software package: working window, design tree, working tools
2. Basic working tools for creating 2D sketches.
3. Independent creation and editing of simple 2D sketches on a computer.
4. Basic working tools for creating 3D models.
5. Independent creation and editing of simple 3D models on a computer.
6. Laboratory work «Modeling simple 3D models»

Lesson № 2

Topic: «Simulation of solid-state samples»

1. Creating holes for fasteners on various solid parts
2. Simulation of strengthening ribs
3. Axis of symmetry. Mirror reflection.
4. Create 2D sketches and 3D models with the Mirroring tool.
5. Arrays
6. Laboratory work «Modeling of solid parts»

Lesson № 3

Topic: « Standard and special screw thread. Simulations of dental implant»

1. Creating a standard screw thread
2. Chamfer.
3. Special screw thread. Features of special thread modeling.
4. Spring tool and its features
5. Rotate tool
6. Self-simulation of a dental implant on a computer
7. Laboratory work «Modeling of a dental implant»

Lesson № 4

Topic: «Surface simulations. Simulation of the tooth crown»

1. Basics of simulations of the surfaces.
2. Creating freeforms.
3. Editing the shape and surface area.
4. Surface stitching
5. Self-modeling of the tooth crown surface.
6. Laboratory work «Modeling of the crown of the tooth»

Lesson № 5

Topic: « Calculation of the stress-strain conditions and simple resistance of dental materials »

1. Calculation of simple tensile strength
2. Calculation of simple compression resistance
3. Construction of tension/compression diagrams
4. Homework

Lesson № 6

Topic: « Simulations and calculation of planar transverse bending of dental materials»

1. Calculation of planar transverse bending
2. Simulation of planar transverse bending
3. Simple strength and stiffness calculations
4. Laboratory work « Simulations and calculation of planar transverse bending of dental materials».

Lesson № 7

Topic: «Building prefabricated models»

1. Constraints and combinations in prefabricated models
2. Connection of prefabricated models. Inserting components in the assembly.
3. Independent modeling of the assembly of simple structures.
4. Independent modeling of assembly of complicated structures.
5. Prefabricated structures in dentistry.
6. Laboratory work «Prefabricated models»

Lesson № 8

Topic: «Simulation of the jaw and dentition»

1. Introduction to the interface of the software package for CAD modeling in dentistry.
2. The main working tools of the software package.
3. Independent modeling and installation of orthopedic structures based on a full crown.
4. Simulation of the jaw and dentition
5. Dynamic virtual articulation. Checking and correcting occlusion.
6. Laboratory work «Simulation of the jaw and dentition»

Lesson № 9

Topic: «Colloquium: 3D simulation and nanomaterials in Dentistry»

Course control. Colloquium «3D simulation and nanomaterials in Dentistry».

Approved at the meeting of the department

Head of department Machneva T.V.