

CONTENT OF CLASSES
«PHYSICS, MATHEMATICS»
Anglophone Students of the 1 Course
Specialty «DENTISTRY»
1 term of 2026/2027

SECTION 1
“Basic Concepts of Mathematical Statistics”

Class No. 1

Basic concepts of Mathematical Statistics 1

1. Problems of mathematical statistics. General population and sample. Representativeness of the sample.
2. Statistical series. Numerical characteristics of statistical series.
3. Graphical representations of statistical series: frequency polygon, histogram.
4. Control of independent work on the topic "Probability Theory".

Class No. 2

Basic concepts of Mathematical Statistics 2

1. Estimation of General Population parameters based on its sample.
2. Confidence interval. Confidence probability. Significance level.
3. Methods for testing statistical hypotheses: t – Student’s criterion, F – Fisher’s criterion.
4. Nonparametric criterion, concept of ranks. Ranking of a sample, sum of ranks.
5. Testing the hypothesis about the equality of the means of two general populations with an unknown distribution law. U – Mann–Whitney criterion.
6. Laboratory work “Mathematical statistics”
4. Control of independent work on the topic " Statistical Hypotheses".

Class No. 3

Current midterm (Module) control for Section 1: **CONTROL WORK “Mathematical statistics”**

SECTION 2
“Mechanical and thermal properties of biological tissues and dental materials”

Class No. 4

Theme: Mechanical properties of materials 1

1. Deformation. Deformation types.
2. Hooke's Law. Young's modulus. Stress and Strain.
3. Poisson's ratio.
4. Stress-Strain diagram.
5. Phenomena of creep and relaxation of stress, and their importance in Dentistry.
6. Mechanical properties of tooth tissues and dental restorative materials.
7. Problem solving.
8. Laboratory work No. 3 “Mechanical properties of solids”.

Class No. 5

Theme: Mechanical properties of materials 2

1. Hardness and Strength of materials. Tensile strength.
2. Methods of hardness determination: Brinell, Vickers, Rockwell and Shore hardness tests.
3. Hardness and strength of tooth enamel and dental materials.
4. Mechanical properties of rubber-like materials.
5. Problem solving.
6. Control of independent work on the topic " Methods for measuring the hardness of materials".
7. Laboratory work "Determination of hardness by the Shore hardness test".

Class No. 6

Theme: Flow and viscosity of fluids

1. Newton's equation. Viscosity and methods of its measurement.
2. Viscosity of dental materials.
3. Determination of fluid viscosity by Stokes' method.
4. Fluid flow. Laminar and turbulent flow. Reynolds number.
5. Laminar flow of fluids in cylindrical tubes. Poiseuille's equation.
6. Problem solving.
7. Laboratory work No.4., Part II "Ostwald method for determination of a viscosity coefficient".

Class No. 7

Theme: Surface tension. Capillary phenomena. Humidity.

1. Strength and coefficient of surface tension.
2. Wetting and non-wetting.
3. Capillary phenomena, their role in Dentistry.
4. Problem solving.
5. Control of independent work on the topic "Humidity of dental materials and air".
6. Laboratory work "Measurement of the surface tension of liquids".

Class No. 8

Theme: Thermal properties of materials

1. Heat exchange. Thermal capacity of dental materials.
2. Thermal conductivity, thermal diffusivity as important thermal characteristics of substances and materials in dentistry.
3. Thermal resistance and its importance for the performance properties of materials at elevated temperatures.
4. Heat (thermal) expansion. Coefficients of linear and volumetric thermal expansion.
5. Problem solving.
6. Laboratory work "Determination of the Coefficient of Linear Thermal Expansion of a solid".

Class No. 9

Current midterm (Module) control for Section 2: **COLLOQUIUM 1**

SECTION 3

"Physical fundamentals of Diagnostic and Therapeutic Methods in Dentistry"

Class No. 10

Theme: Geometrical Optics and its importance in Dentistry

1. Rectilinear propagation of light. Speed of light.
2. Absolute and relative refractive indices of the medium.
3. Specular, diffuse and mixed reflection. Light scattering.
4. Refraction of light at the boundary of two media.
5. Laws of light reflection and refraction
6. Total internal reflection of light. Fiber optics and its application in Medicine.
7. Refractometry.
8. Problem solving.
9. Laboratory work No. 12 "Determination of the refractive index of a liquid with a refractometer".

Class No. 11

Theme: Optical Microscopy. Dental Microscope

1. Lenses. Types of lenses. Construction of images in thin lenses.
2. Thin lens formula. Optical power of the lens.
3. Optical microscope, path of rays in it.
4. Microscope magnification. Resolution limit and resolving ability (power) of the microscope.
5. Dental microscope.
6. Problem solving.
7. Laboratory work No. 13. "Measurement of small object sizes using a microscope".

Class No. 12

Theme: Light absorption and scattering in Dentistry

1. Absorption of light by a matter. Bouguer's Law.
2. Absorption of light by solutions. Absorption cross-section. Bouguer-Lambert-Beer Law.
3. Transmittance coefficient. Optical Density.
4. Absorption spectrum. Absorption spectra of hard tooth tissues.
5. Scattering of light. Light scattering detection.
6. Absorption and scattering of light by tooth tissues.
7. Problem solving.
8. Laboratory work No.15. « Concentration colorimetry in laboratory practice».

Class No. 13

Theme: Photometry. Light sources in Dentistry

1. Photometry. Point source of light. Solid angle.
2. Photometric characteristics of light: Luminous Flux, Illuminance, Luminous intensity, Luminance.
3. Sources of light in Dentistry. Influence of light sources on the photoactivated curing process and control of this process.
4. Illumination of the working field of a dentist.
5. Problem solving.
6. Control of independent work on the topic " Characteristics of light".
7. Laboratory work "Study of the photometric characteristics of the light source".

Class No. 14

Theme: X-rays and their application in Dentistry. Dosimetry

1. X-ray radiation. X-ray tube device.
2. Types of X-ray radiation and its characteristics.
3. Interaction of X-ray radiation with matter.
4. Radiation exposure during Roentgen Diagnostics.
5. Types of ionizing radiation.
6. Dosimetry. Absorbed dose, Exposure dose, Equivalent and Effective Equivalent doses, units of their measurement. Dose rate.
7. Relationship between Absorbed and Equivalent doses. Relationship between Exposure dose and Activity of a radioactive sample.
8. Maximum Permissible Doses.
9. Methods of protection against ionizing radiation.
10. Problem solving.
11. Laboratory work "Measurement of background radiation with a dosimeter".

Class No. 15

Current midterm (Module) control for Section 3: **COLLOQUIUM 2**

Class No. 16

CREDIT

Intermediate certification in the Discipline "Physics, Mathematics"