Federal State Autonomous Educational Institution of Higher Education

**I.M. Sechenov First Moscow State Medical University**

**Ministry of Health of the Russian Federation**

**(Sechenov University)**

“Approved”

Academic council of FSAEI HE

I.M. Sechenov First Moscow

State Medical University

(Sechenov University)

“\_\_\_\_\_” of \_\_\_\_\_\_\_\_\_\_\_ 20\_\_\_

Protocol №\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SYLLABUS OF THE ELECTIVE

\_\_\_ BIOPHYSICAL TECHNOLOGIES IN DENTISTRY \_\_\_\_\_\_\_\_\_

\_ Basic professional educational program of higher education – specialty program

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_31.05.03 Dentistry \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2020-2021 year of admission

Discipline complexity \_\_\_\_\_\_\_\_ 2.0 \_\_\_\_\_\_\_\_\_ credit units

**1. Goals and objectives of mastering the elective course "Biophysical technologies in dentistry"**

**Purpose** Mastering theoretical and practical aspects of the use of biophysical technologies for the diagnosis, prevention, treatment and rehabilitation in dentistry.

**Objectives of the discipline.**

***To know:***

- the basic principles of the use of biophysical technologies for the diagnosis, prevention, treatment and rehabilitation in dentistry.

***To be able to:***

- apply biophysical methods of diagnosis, prevention, treatment and rehabilitation of dental diseases in dental office.

***To demonstrate:***

- skills in applying biophysical technologies in dentistry.

**2. Place of the Discipline in the structure of University Educational Program**

2.1. The Discipline is a part of Educational Unit С.3.18 Dentistry

2.2. To study the discipline, following knowledge and skills formed by previous disciplines / practices are necessary:

- mathematical, natural science course (physics, mathematics; biological chemistry - biochemistry of the oral cavity; normal physiology - physiology of the maxillofacial area; pathophysiology - pathophysiology of the head and neck);

- professional courses (internal diseases, clinical pharmacology; medical rehabilitation; general surgery, surgical diseases; dentistry).

2.3. The study of the discipline is necessary for the knowledge, skills and abilities formed by other professional disciplines / practices: dentistry, maxillofacial surgery, pediatric dentistry, orthodontics and children's prosthetics.

**3. Requirements for the results of mastering the discipline.**

The goal of mastering the discipline is formation of following professional competences (PC):

|  |  |  |  |
| --- | --- | --- | --- |
| n / # | Code of PC | Competence content  | As the result of mastering the discipline students must: |
| Know | Be competent | Have skills | Assessment tools \* |
|  | PC-5 | Readiness for collection and analysis of patient complaints, data his/her history, examination results, laboratory, instrumental, post-mortem and other studies in order to recognize the condition or the presence or absence of dental disease | Basic and additional methods of examination using biophysical technologies | Conduct and interpret the data of the basic and additional methods of examination using biophysical technologies | Methods of the basic and additional examination of the patient using biophysical technologies | Questioning, test, clinical tasks |
|  | PC-6 with the | Ability to determine the patients’ basic pathological conditions, symptoms, syndromes, dental diseases, clinical entities, in accordance with the International Statistical Classification of Diseases and problems related to health (ICD).  | Pathological conditions, symptoms and syndromes of dental diseases, the International Classification of Diseases (ICD)  | To identify patients basic pathological symptoms and syndromes of diseases using biophysical technologies, and classify them according to ICD | Basic diagnostic methods to detect pathological conditions and dental diseases using biophysical technologies | Questioning, test, clinical tasks |
|  | PC-8 | Ability to determine the treatment plan for patients with different dental diseases. | The basic principles and methods of dental diseases treatment using biophysical technologies | Make a comprehensive treatment plan, select the necessary physiotherapy tools, evaluate the effectiveness and safety of treatment with biophysical technologies | Physical methods of dental diseases treatment | Questioning, test, clinical tasks |
|  | PC-9  | Willingness to treat dental diseases in outpatient and inpatient conditions. | Basic treatment methods of dental diseases using biophysical technologies | To treat dental disease using biophysical technologies | Methods for dental diseases treatment using biophysical technologies | Questioning, test, clinical tasks |

*\* kinds of evaluating tools, which can be used during the development of competence*: *colloquium control work, interview on situational tasks, written or computer testing, standard calculations , individual tasks, essay*

**4. Sections of discipline and competences that are formed during the study:**

|  |  |  |  |
| --- | --- | --- | --- |
| p / No. | Code of PC | Section of the discipline | Content |
| 1 | PC-5, PC-6, PC-8, PC-9. | Physical factors used in dentistry | Galvanization and drug iontoophoresis, low-frequency pulsed currents, medium and high-frequency alternating current, electric and magnetic fields, light therapy, ultrasound, aerosol therapy, ozone therapy, water, heat, and mud therapy. Application in dentistry. Indications and contraindications. Technique and procedure. |
| 2 | PC-5, PC-6, PC-8, PC-9 | Principles of application of biophysical technologies in treatment and rehabilitation in dentistry | Principles of application of physical methods in the treatment and rehabilitation of caries and non-carious lesions of hard tooth tissues, pulpitis and periodontitis, periodontal and oral mucosa diseases, inflammation and injuries of the maxillofacial area, facial nerve disorders and temporomandibular joint. |

1. **Distribution of discipline labour intensity and academic work in semesters.**

|  |  |  |
| --- | --- | --- |
| Academic works | Labour intensity | Labour intensity (academic hours) in semester |
| credits  | academic hours |
| 5 | 6 | 7 | 8 | 9 | 10 |
| Classroom work | 2,0 |  |  |  |  |  | 36 |  |
|  Lectures (L) |  |  |  |  |  |  | 8 |  |
|  Lab works (LW) |  |  |  |  |  |  |  |  |
|  Practical classes (PC) |  |  |  |  |  |  |  |  |
|  Clinical classes (CC) |  |  |  |  |  |  | 28 |  |
|  Seminars (S) |  |  |  |  |  |  |  |  |
| Self-study (S-S) |  |  |  |  |  |  | 20 |  |
|  Intermediate attestation |  |  |  |  |  |  | 4 |  |
| TOTAL | 2.0 |  |  |  |  |  | 60 |  |

**5.1. Discipline sections, academic works and current assessment tools**

|  |  |  |  |
| --- | --- | --- | --- |
| n / No. | Discipline sections | Academic works (academic hours) | Assessment tools |
|  |  |  | L | CC | S | SS | total |  |
| 1 | Physical factors used in dentistry | 4 | 14 |  | 10 | 28 | Test, clinical tasks |
| 2 | Principles of biophysical technologies applying for treatment and rehabilitation in dentistry | 4 | 14 |  | 10 | 28 | Test, clinical tasks |
| 3 | Intermediate attestation |  |  |  |  | 4 |  |
|  | TOTAL | 8 | 28 |  | 20 | 60 |  |

**5.2. Distribution of lectures**

|  |  |  |
| --- | --- | --- |
| n / a. | Themes of the lectures | Academic hours |
| 1. | Use of direct and alternating current of low frequency in dentistry | 2 |
| 2. | Use of alternating current of medium and high frequency, electromagnetic fields, ultrasound, light therapy, water, heat, mud therapy, aerosol therapy and ozone therapy in dentistry. | 2 |
| 3. | Guideline for the use of physical methods of treatment and rehabilitation in patients with hard tooth tissues diseases. | 2 |
| 4. | Guideline for the use of physical methods of treatment and rehabilitation in patients with periodontal and oral mucosa diseases. | 2 |
|  | TOTAL | 8 |

**5.3. Distribution of lab work**

|  |  |  |
| --- | --- | --- |
| n / a. | Theme of the lab work | Academic hours |
|  |  | Semester | Semester |
|  | **Not conducted** |  |  |
|  |  |  |  |
|  |  |  |  |
|  | TOTAL (total - AH) |  |  |

**5.4. Distribution of practical classes**

|  |  |  |
| --- | --- | --- |
| n / № | Name of topics for practical classes | Academic hours |
|  |  | Semester | Semester |
|  | **Not conducted** |  |  |
|  |  |  |  |
|  |  |  |  |
|  | TOTAL (total - AH) |  |  |

**5.4. Distribution of clinical classes**

|  |  |  |
| --- | --- | --- |
| n / № | The name of the topics of practical classes | AH |
| 1 | Galvanization and Iontophoresis.  | 2 |
| 2 | Transcanal effects of direct current | 2 |
| 3 | Physical diagnostic methods in dentistry. Electric pulp test. Apex Location. Measurement of the electrochemical potential of the oral cavity. | 3 |
| 4 | The use of pulse currents of low frequency, alternating currents of medium and high frequency, electric and electromagnetic fields in dentistry. Fluctuation. Darsonvalization. Diathermy. Magnetotherapy. | 3 |
| 5 | The use of phototherapy in dentistry. The use of ultraviolet, visible and infrared radiation. Laser therapy. Photodynamic therapy. | 2 |
| 6 | The use of vibrotherapy and ultrasound in dentistry. Iontotherapy, aerosol therapy, ozone therapy. Water, heat, mud therapy. | 2 |
| 7 | Physical methods in the treatment of carious and non-carious lesions of hard tooth tissues.  | 2 |
| 8 | Physical methods of diagnosis and treatment in endodontics. | 2 |
| 9 | Guideline for the use of physical methods in treatment and rehabilitation of patients with inflammatory processes of the maxillofacial region. | 2 |
| 10. | Guideline for the use of physical methods in treatment and rehabilitation of patients with traumatic injuries of the maxillofacial region. | 2 |
| 11 | Guideline for the use of physical methods in treatment and rehabilitation of patients with periodontal and oral mucosal diseases. | 3 |
| 12 | Guideline for the use of physical methods in treatment and rehabilitation of patients with facial nerves diseases and diseases of the temporomandibular joint | 3 |
|  | TOTAL | 28 |

**5.6. Distribution of seminars**

|  |  |  |
| --- | --- | --- |
| n / № | Themes of the seminars | Academic hours |
|  |  | Semester | Semester |
|  | **Not conducted** |  |  |
|  |  |  |  |
|  |  |  |  |
|  | TOTAL (total - AH) |  |  |

**5.7. Distribution of self-study by types**

|  |  |  |
| --- | --- | --- |
| № | Type of self-study work | Academic hours |
| 1. | Work with literary and other sources of information for the studied section | 10 |
| 2. | Work with electronic educational resources | 10 |
|  | TOTAL  | **20** |

**6. Assessment tools**

**6.1. Types of current control and intermediate attestation, assessment tools.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| №  | № of semester  | Types of control | Part of the discipline  | Assessment tools |
| Type | Number of questions  | Number of distractors |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | 9 | MCQs, interview, clinical cases | Physical factors used in dentistry | Test, clinical tasks | 505 | 55 |
|  | 9 | MCQs, interview, clinical cases | The principles of biophysical technologies in treatment and rehabilitation in dentistry | Test, clinical tasks | 505 | 55 |

*\* forms of monitoring: monitoring individual work of students, monitoring mastering the theme; forms of intermediate attestation: test, exam*

**6.2. Examples of assessment tools**

***TEST***

**Establish compliance**

|  |  |
| --- | --- |
| **1. LEVEL OF THE PULP DAMAGE** |  **EPT VALUES** |
| 1) healthy pulp |  A) more than 200 μA |
| 2) damage of the coronal pulp |  B) 7 - 60 μA |
| 3) damage of the root pulp |  C) 61 - 100 μA |
| 4) total necrosis of the pulp |  D) 2 - 6 μA |
|  |  E) 101 - 200 μA. |

**Choose the correct answer**

**2. FOR THE BIOLOGICAL METHOD OF PULPITIS TREATMENT THE FOLLOWING METHODS ARE USED**

1) Laser therapy

2) laser therapy, UVD

3) laser therapy, UVD, microwave therapy

4) laser therapy, UVD, microwave therapy, paraffin therapy

5) laser therapy, UFO, microwave therapy, paraffin, muds

**3. BIOLOGICAL METHOD OF PULPITIS TREATMENT CAN BE PERFORMED IF EPT IS**

1) 1 - 7μA

2) 7 - 25 μA

3) 25 - 45 μA

4) 45 - 60 μA

5) 60 - 100 μA

**4. THE ACTION OF TRANSCANAL ELECTROPHORESIS TO THE PULP IS**

1 ) anti-inflammatory

2) analgesic

3) devitalizing

4) canal-expanding

5) desensitizing

**5. PARAMETERS OF TRANSCANAL IODINE ELECTROPHORESIS FOR PULPITIS TREATMENT:**

1) 1 procedure for 15 min

2) 1 procedure for 20 min

3) 2 procedures for 15 min

4) 2 procedures for 20 min

5) 1 procedure for 30 min

***CLINICAL CASES***

**Clinical task № 1**

 **Patient M., 45-year-old man. The diagnosis is chronic periodontitis of the upper first right molar. The X-ray is remarkable for the radiolucency with ill-defined borders in the periapical area of all the roots, less than 3 mm in size. In the apical third of the palatal root, the separated endodontic file was detected without extrusion in the periapical zone, the buccal root canals are obturated for 1/2 of the root length. The transcanal Iontophoresis with 10% potassium iodide solution was prescribed.**

 **Questions:**

1. The use of transcanal Iontophoresis in root canals with separated metal endodontic instrument is conraindicated (in what cases?)

2. The active electrode should be placed (where?)

3. During the procedure, the tooth should be isolated (with what?)

4. The course of treatment consists of (how many procedures?)

5. The duration of the procedure is (how much time?

**Answers:**

1. Contraindicated in cases where the instrument is extruded in the periapical zone.
2. Electrode should be placed in the orifice of root canal
3. Isolated with sticky wax
4. Treatment course consists of 3 - 4 procedures
5. Duration of each procedure is 20 min

**Clinical task № 2**

 **Patient A., 35-year-old. During the endodontic treatment of lower left second molar due to prosthetic indications it was revealed, that root canals can be negotiated to the 2/3 of the length.** **After the application of the devitalizing paste, electric pulp test from the root canals orifices is 80 μA. A course of transcanal iontophoresis was prescribed.**

 **Questions:**

1. What is the purpose of the transcanal iontophoresis prescription?

2. Is anesthesia necessary during the procedure?

3. What medications can be used for the transcanal iontophoresis

4. What is the minimal amperage for the pulpitis treatment?

5. What method allows to assess the effectiveness of transcanal iontophoresis in pulpitis?

**Answers:**

1. Pulp devitalization
2. Anesthesia is necessary.
3. Potassium iodide, dimexide.
4. Current strength:3 mA.
5. EPT.

**Clinical task № 3**

 **Patient D., 28-year-old. The diagnosis is periapical abscess without sinus in the area of the lower right first molar. Percussion is painful; in the root canals serous-purulent exudate is present. The X-ray demonstrates the radiolucency with ill-defined borders less than 3 mm in size**

 **Questions:**

1. What biophysical treatment method should be prescribed?

2. What is the purpose of the procedure?

3. The active electrode is anode or cathode?

4. With what solution should be moistened the active electrode?

5. The treatment course consists of (how many procedures?)

**Answers:**

1. Anod galvanization
2. Reduction of exudation, anti-inflammatory effect
3. Anode
4. Water.
5. Course of treatment 3 - 4 procedures.

**Clinical task № 4**

 **Patient M., 42-year-old. During the endodontic treatment of central lower left incisor due to prosthetic indications it was revealed, that root canal can be negotiated to the 2/3 of the length. The electric pulp test value from the root canal orifice is 150 μA. A course of depo phoresis was prescribed.**

 **Questions:**

1. What medication should be applied in the root canal when using this method?

2. What current should be used for the procedure?

3. An electrode inserted in the root canal should be connected to anode or cathode?

4. With a current of 1 mA what is the duration of the procedure?

5. The treatment course consists of (how many procedures?)

**Answers:**

1. Copper-calcium hydroxide
2. Permanent current
3. Cathode
4. 5 min.
5. Treatment course 3 procedures.

**Clinical task № 5**

 **Patient K., 38-year-old. The diagnosis is chronic ulcerative pulpitis of the lower right first molar. After the application of the devitalizing paste, electric pulp test value from the root canals orifices is 180 μA. All canals can be negotiated to the 2/3 of the length. The separated endodontic file was detected** **in the mesial lingual canal without extrusion in the periapical zone. A course of apex phoresis was prescribed.**

 **Questions:**

1. Where should be placed the apex-phoresis active electrode?

2. The use of apex phoresis in root canals with separated metal endodontic instrument is contraindicated (in what cases?)

3. With what solution should be moistened the root canal before the procedure?

4. What is the duration of each procedure of apex phoresis?

5. What conductor should be used for apex-phoresis?

**Answers:**

1. In the root canal
2. Contraindicated in cases where the instrument is extruded in the periapical zone.
3. Saline
4. 5 min
5. Silver-copper electrode

**7.Educational & methodical support of the discipline (printed editions, electronic publi-cations, internet other network resources)**

 **7.1. The basic textbooks 7.1. List of literature:**

|  |  |  |
| --- | --- | --- |
| No | Book  | Authors |
| At the department | In the library |
| 1. | Volkov A.G., Dikopova N.Zh., Makeeva I.M., Sokhova I.A. Physical methods for the diagnosis and treatment of dental diseases. Tutorial. - M.: Publishing. First MGMU them. THEM. Sechenov. 2016 .-- 62 p. | 20 |  |
| 2. | Volkov A.G., Dikopova N.Zh., Makeeva I.M., Byakova S.F. Physical methods for the diagnosis and treatment of periodontal and oral mucosa diseases. Tutorial. - M.: Publishing. First MGMU them. THEM. Sechenov. 2016 .-- 48s. | 20 |  |
| 3 | Makeeva I.M., Volkov A.G., Daurova F.Yu., Dikopova N.Zh., Kozhevnikova L.A., Makeeva M.K., Talalaev E.G., Shishmareva A.L. Physical treatment methods in dentistry. Textbook allowance / Moscow, 2017 .-- 112s. | 20 |  |
| 4. | Volkov A.G., Mikhaleva I.N. “Physical methods of treatment of periodontal diseases” in the book: Therapeutic dentistry: textbook: at 3 o’clock / ed. G.M. Barera. - M., 2008. - Part 2, - Periodontal disease. - S. 210 - 221. | 1 |  |

**7.2. Additional editions**

|  |  |  |
| --- | --- | --- |
| No. | Book  | Authors |
| At the department | In the library |
| 1. | O.Efanov, YuS. Sukhanova “Physical methods of treatment of periodontal diseases”. M., 2010 .-- 188 p. | 10 |  |
| 2. | Ed. V.M. Bogolyubov. Physiotherapy and balneology. Book I, - M., 2008. – 408p. | 1 | 1 |
| 3. | Ed. V.M. Bogolyubov. Physiotherapy and balneology. Book II, - M., 2008 .-- 312 p. | 1 | 1 |
| 4. | Ed. G.N. Ponomarenko. Physiotherapy. National leadership. \_ M., 2009 .-- 864 p. | 1 | 1 |

**7.3. Tutorial guides.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  № | Name | Authors | Edition | Exemplars |
| In the library | at the department |
| 1 | 2 | 3 | 4 | 7 | 8 |
|  | Instrumental methods of diagnosis and treatment of dental diseases. | Volkov A.G., Dikopova N.Zh., Makeeva I.M., Sokhova I.A. | Ed. First MGMU them. THEM. Sechenov. 2016 |  | 20 |
|  | Physical methods for the diagnosis and treatment of periodontal disease and oral mucosa. | Volkov AG, Dikopova NJ, Makeyev IM, Byakova SF | Ed. First MGMU them. THEM. Sechenov. 2016 |  | 20 |
|  | Physical treatment methods in dentistry. | Makeeva I.M., Volkov A.G., Daurova F.Yu., Dikopova N.Zh., Kozhevnikova L.A., Makeeva M.K., Talalaev E.G., Shishmareva A.L. | Ed. RUDN, 2017 |  | 20 |

**7.4. Recommendations for the tutors**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  No. | Name | Authors | Edition | Exemplars |
| In the library | at the department |
| 1 | 2 | 3 | 4 | 7 | 8 |
|  | Logical-didactic schemes of practical exercises in physiotherapy “Physiotherapy of dental diseases” | Edited by O.I. Efanova | M., 2013 |  | 20 |
|  | Logical and didactic schemes of practical exercises in physiotherapy “Physical healing factors” | Edited by O.I. Efanova | M., 2013 |  | 20 |

**8. Material and technical instrumentation of the discipline.**

**8.1. Logistic support of the discipline.**

1. dental offices with universal dental units;

2. class rooms for reports, presentations and discussions.

**8.2. Equipment for tutorials.**

-multimedia complex (laptop, projector, screen), TV, video camera, slide scope, VCR, PC, video and DVD players, monitors, slide sets, tables / multimedia visual materials in various sections disciplines, videos, boards, etc.

- diagnostic and medical equipment (D.C. devices, pulse currents devices, variable currents of medium and high frequency devices, magnet therapy devices, light therapy equipment, ultrasound apparatus etc.).

- electrodes, gaskets, spirits, sticky dental wax, medicines and dental materials.

- Dental units, chairs, tables and chairs, dental trays with a full set of instruments used in the therapeutic department

- Forms: consultation papers, return papers, prescriptions.

**Educational technologies in an interactive form used in the process of teaching the discipline:**

**9.1. Examples of educational technologies in an interactive form:**

In accordance with the requirements of the Federal State Educational Standard, the active and interactive forms of performing classes are widely used in the educational process (computer presentation of expert materials, computer simulation; visualized test tasks; videos, analysis of specific situations, etc.) The specific weight of classes performed in interactive forms is **at least 10% of** classroom classes.

* 1. **Electronic educational resources used in the process of teaching the discipline:**

|  |  |  |
| --- | --- | --- |
| No. | Name and brief description of electronic educational and information resources (electronic publications and information databases) | Number of copies, access points |
| *1* | *2* | *3* |
| 1 | Educational portal of the First MGMU them. THEM. Sechenovahttp: //dl.sechenov.ru/ |  |
| 2 | Central Scientific Medical Library <http://www.scsml.rssi.ru/> |  |
| 3 | Library of Natural Sciences of the Russian Academy of Sciences<http://www.benran.ru/>; [http://www.benran.ru/Magazin/El/Str\_elk1.htm](http://www.benran.ru/magazin/el/str_elk1.htm) |  |
| 4 | International citation database PubMedhttp://www.ncbi.nlm.nih.gov/ |  |
| 5 | Publishing house of academic medical literature Elsevierhttp: //www.elsevier. com / |  |
| 6 | Scientific Electronic Library eLibraryhttp://elibrary.ru// |  |
| 7 | Information and educational portal for doctors Univadishttp://www.univadis.ru/ |  |
| 8 | Electronic Medical Library Consultant of a doctorhttp://www.rosmedlib.ru/ |  |

Working elective discipline program “Biophysical Technologies in Dentistry” was developed by the Department of Therapeutic Dentistry

Developers ::

Professor of the Department, DDS \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ A.G. Volkov

Associate Professor, PHD \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ N.Ž. Dikopova

Accepted at a reunion of the Department of Restorative Dentistry

From \_\_\_\_\_\_\_\_\_\_\_\_\_20\_\_\_\_\_Protocol No. \_\_\_\_

Head of the Department, Professor I.M. Makeeva

*Signature Full name*

Approved by the Teaching and Methodical Council of the Faculty of Dentistry

\_\_\_ \_\_\_\_\_\_\_20\_\_\_\_\_\_Protocol No. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chairman of the EMC \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ О .I. Admakin

 and the first names, last name,