## MINISTRY OF HEALTH CARE OF UKRAINE

## KHARKIV NATIONAL MEDICAL UNIVERSITY

## II medical faculty

## Department of Internal Medicine №2, Clinical Immunology and Allergology

## named after Academician LT Malaya

## SYLLABUS

## SELECTIVE EDUCATIONAL DISCIPLINE

## "ELECTROCARDIOGRAPHY IN CLINICAL PRACTICE"

## Area of knowledge 22 "Health"

## Specialty 222 "Medicine"

Educational-professional program Medicine of the second (master's) level of higher education

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| The syllabus was considered at the Department of Internal Medicine N2, clinical immunology and allergology named after Academician L.T.MaloProtocol No. 23 byAugust 28, 2020 No. Head of department\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Kravchun P.G. « » 2020 |   | Approved by the methodological commission of KhNMU on the problems of professional training of therapeutic profile  Protocol No. 1 byAugust 31, 2020 No. Head\_\_\_\_\_\_\_\_\_\_\_\_­\_\_\_\_\_\_Kravchun P.G. "" 2020 |

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Information about teachers:

The developer of the syllabus is Dobrovolska Inna Mykolayivna, Associate Professor of the Department of Internal Medicine №2, Clinical Immunology and Allergology named after Academician LT Small, to. Honey. N.

Teacher:

1) Dobrovolska Inna Mykolayivna - Associate Professor of Internal Medicine №2, Clinical Immunology and Allergology named after Academician LT , Ph.D.

Occupational interests: myocardial infarction, essential hypertension, acquired heart defects, cardiovascular diseases in combination with pathologies of the endocrine system (eg, diabetes, hyperthyroidism), arrhythmias and conduction of the heart, clinical electrocardiography, cardiovascular disease.

Trajectory of professional development:

Location - "City Clinical Hospital № 27" Kharkiv City Council, Kharkiv, st. Pushkinskaya, 41

Discipline information:

1. Description of the discipline:

The course is the sixth

Year of preparation - 6, semester - 11

Number of the credits - 3

The total number of the hours - 90

Hours for full-time study: classes - 30, independent student work - 60

**General characteristics of the discipline:**

 The discipline "Electrocardiography in clinical practice" consists of seven sections: "Theoretical and practical foundations of electrocardiography. Normal electrocardiogram "," General scheme of ECG interpretation "," Electrocardiogram in cardiac arrhythmias "," Electrocardiogram in conduction disorders "," Electrocardiogram in hypertrophy of the heart "," Electrocardiogram in coronary heart disease "," Electrocardiogram in some diseases syndromes ».

The role and place of the discipline in the system of training:

The course "Electrocardiography in clinical practice" is an important component of the training of specialists in both therapeutic and cardiac profiles, as it forms the necessary practical skills of ECG diagnostics.

 1**. Purpose and objectives of the discipline:**

The purpose of teaching the discipline "Electrocardiography in clinical practice" is to improve knowledge of the students on ECG diagnostics in the clinic of internal medicine, mastering the techniques of ECG diagnostics in practice, formation modern algorithms for interpreting its results with further analysis of the nature and severity of human disorders. stage of disease development, the formation of a clear idea of ​​the relationship between the pathogenesis of the disease and its clinical and instrumental manifestations.

**The main tasks of the studying a discipline** "ECG in clinical practice" are:

• acquisition by students of knowledge of normal and pathological ECG;

• mastering the skills of ECG recording in the conventional 12 leads;

• mastering the skills of analysis of normal and pathological electrocardiogram and clinical interpretation of the obtained data;

• mastering the skills of writing the ECG protocol of the conclusion;

• acquisition of knowledge on ECG changes in disorders of automatism, excitability and conductivity;

• study of ECG signs of hypertrophy of the heart;

• acquisition of knowledge about ECG changes in various clinical forms of coronary heart disease, electrolyte, metabolic changes and syndromes of preexcitation (preexcitation) of the ventricles.

2. Discipline status - selective; discipline format - mixed.

3. Teaching methods: lectures (using multimedia support), practical classes, VTS; methodical recommendations (see below), presentations; distance learning (Internet conferences on the Zoom network).

4. Recommended reading:

I. Shved MI, Grebenik MV Fundamentals of practical electrocardiography: a textbook. - Ternopil: Ukrmedbook 2000. - 128 p. - ISBN 966-7364-77-1.

II. ECG in practice = TheECGinPractice = ECG in practice: a textbook / John R. Hampton; translation of the 6th English. edition, trilingual. - All-Ukrainian specialized edition "Medicine", 2018. - 560 p. - ISBN978-617-505-713-1.

III. Electrocardiography. Functional ECG tests. Daily blood pressure monitoring. Holter ECG monitoring. Analysis of heart rate variability (HRV). Functional diagnostics in pulmonology: teaching method. way. to practice. classes on functional diagnostics for students of VI course med. f-tu / way. VA Vizir, IB Prikhodko, OV Demidenko [etc.]. - Zaporozhye, 2014. - 116 p.

IV. Electrocardiography: textbook. manual / VV Murashko, AV Strutynsky. - 14th ed., Reworked. - М .: 2017. - 360 с. : ill. - ISBN 978-5-00030-460-0

V. Electrocardiographic method of research. Methods of registration and decoding of the electrocardiogram: methodical instructions to practical occupations of students on propaedeutics of internal medicine / comp .: TV Ascheulova, ON Kovaleva, NA Safargalina-Kornilova. - Kharkiv: KhNMU, 2016. - 16 p. (http://repo.knmu.edu.ua/handle/123456789/14511)

VI. ECG - signs of disorders of automatism, excitability of the myocardium: guidelines for practical training of students in propaedeutics of internal medicine / compilers: TV Ascheulova, TM Ambrosova. - Kharkiv: KhNMU, 2018. - 26 p. (http://repo.knmu.edu.ua/handle/123456789/22014)

VII. ECG - signs of conduction dysfunction: guidelines for the practical classes students in internal medicine / TV Ascheulova, TM Ambrosova. - Kharkiv: KhNMU, 2018. - 11 p. (http://repo.knmu.edu.ua/handle/123456789/22076)

**5. Prerequisites**: medical physics; normal anatomy; normal physiology; topographic anatomy; pathological anatomy; pathological physiology; biochemistry;

Co-requisites: therapy, cardiology.

6. Learning outcomes: After passing the discipline the student must know:

• the principle of the ECG method and its anatomical and physiological basis (basic concepts of electrophysiology of the heart, the structure of the conduction system of the heart);

• modern methods of clinical, laboratory, instrumental examination of patients with pathology of the cardiovascular system;

• general scheme of interpretation of electrocardiography;

• mechanisms of arrhythmias, ECG signs of disorders of automaticity and excitability, the principles of emergency care for paroxysms and tachyarrhythmias;

• ECG signs of blocks;

• classification of arrhythmias and conduction of the heart;

• ECG signs of ventricular overexcitation syndromes;

• ECG changes in hypertrophy of the heart;

• ECG changes in various clinical forms of coronary heart disease;

• ECG picture in metabolic and electrolyte disorders, some syndromes and heart disease.

After passing the discipline the student must be able to:

• collect data on patient complaints, medical history, life history, conduct and evaluate the results of physical examination;

• evaluate diagnosis information using a standard procedure based on the results of laboratory and instrumental studies;

• establish a preliminary and clinical diagnosis;

• record the ECG in the standard 12 leads;

• interpret normal and pathological electrocardiogram;

 • diagnose arrhythmias and conduction of the patient on the wedge

• detect ECG signs of hypertrophy of the heart and assess the primary disorders of repolarization ("systolic overload") in left ventricular hypertrophy;

 identify signs of focal (postinfarction cardiosclerosis) and diffuse myocardial changes (repolarization disorders associated with ischemia, metabolic and electrolyte changes) and evaluate them;

 form goals and determine the structure of personal activities;

• keep medical records of the patient (ECG report) on the basis of regulatory documents;

 adhere to a healthy lifestyle, use the techniques of self-regulation and self-control;

• be aware of and guided in their activities by civil rights, freedoms and responsibilities, raise the general cultural level;

• adhere to the requirements of ethics, bioethics and deontology in their professional activities;

• organize the necessary level of individual safety (own and persons cared for) in case of the typical emergency situations

**Discipline content**

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| **No theme** | **Theme** |  |
| 1. | General principles of ECG. Technique of recording ECG. Normal ECG. Formation of ECG-conclusion. | 5 |
| 2. | ECG for heart rhythm disorders. | 5 |
| 3. | ECG in case of impaired conductivity of the heart. | 5 |
| 4. | ECG for hypertrophy of different heart regions | 5 |
| 5 | ECG with myocardial infarction | 5 |
| 6 | ECG in case of electrolyte exchange disorders | 5 |
|   |   | 30 |

**Students Independent woкk**

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| #S/p | Subject Title | NumberHours |
| 1 | Method of recording electrocardiograms. Electrocardiographic equipment. Characteristics of ECG leads. | 2 |
| 2 | Technique of registration of electrocardiograms. Conditions for ECG research. Functional samples: with physical activity, with blockers β-adrenaline-cephalothors, with potassium chloride, with dipyridamole. | 2 |
| 3 | Normal ECG. P-Q(R). Ventricle complex QRST. Teeth Q. Teeth R , S, T, segment S-T, interval Q-T on a normal ECG. | 2 |
| 4 | General scheme of interpretation of the ECG. Analysis of cardiac regularity. Counting the number of heart attacks. Determination of the source of excitation (sinus, atrial, ventricular rhythm, rhythms with AV-connection). Conductivity function estimation | 2 |
| 5 | Determination of the position of the electrical axis of the heart. Analysis of the main teeth. Electrocardiographic conclusion | 2 |
| 6 | The main electrocardiographic signs of sinus arrhythmias: sinus tachycardia, sinus bradycardia, sinus arrhythmia, sinoatrial node weakness syndrome | 2 |
| 7 | Slow and accelerated ectopic rhythms and complexes. Non-paroxysmal tachycardia. Migration of the supraventricular rhythm pacemaker. | 2 |
| 8 | The concept of PEC, as the premature appearance of the heart cycle, and the mechanisms of its development. Various forms of extrasystols (atrium, ventricular, with AV-compound) and their reflection on the electrocardiogram. | 2 |

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| 9 | Paroxysmal tachycardia. The most characteristic ECG are signs of atrial, ventricular and atrioventricular forms of paroxysmal tachycardia. | 2 |
| 10 | Atrium flutter. ECG criteria of the correct (regular) and irregular (irregular) forms. | 2 |
| 11 | Atrium fibrillation (flashing arrhythmia) as consequence of the appearance of several ectopic impulse foci. Paroxysmal, persistent and constant nature of atrial fibrillation.  ECG criteria. | 2 |
| 12 | The concept of heart blocks. Pathogenesis of sinoatrial block. Frequency of detection in clinical practice of intratrial block. | 2 |
| 13 | ECG characteristic of AV block 1rd degree. AV block of the second degree: type I Mobytts, type II Mobytts, typeIII (high-level block). | 2 |
| 14 | Complete AV block (AVblock third degree). Differential diagnosis of degrees of AV block according to the interpretation of ECG .Frederyk's ECG phenomenon as a combination of complete AV block with atrium fibrillation or flutter. | 2 |
| 15 | An unusual ways of the ventricles arousal in the myocardium of the heart as consequence of a complete RBBB or LBBB . The variability of the ECG forms of the ventricle complex during the block bundle of his. | 2 |
| 16 | The concept of an incomplete block bundle of his. ECG criteria of incomplete RBBB and LBBB. Single-beam, two-beam, three-beam block. Focal intraventricular block. | 2 |
| 17 |  ECG criteria of WPW and CLC syndromes | 2 |
| 18 | Factors of variability of ECG changes manifested in hypertrophy of different parts of the heart. The ECG difference of hypertrophy left and right atriums. | 2 |
| 19 | The ECG signs of hypertrophy of the left and right ventricles.  | 2 |
| 20 | Electrocardiographic manifestations of myocardial ischemia of the different localizations. Differential-diagnostic ECG criteria for ischemic damage. Irreversible changes in the muscle fibers of the heart as a result of necrosis (infarction) of the myocardium. | 2 |
| 21 | The concept of Q-a positive myocardial infarction. Discordant features of transmural myocardial infarction. Dynamics of ECG signs depending on the stages of heart attack: acute onset , acute, sub-acute, scar. | 2 |
| 22 |  ECG diagnosis of MI. Correlational relationship between the ECG criteria of the heart attack and the localization of critical stenosis of a certain coronary artery.Early complications of acute myocardial infarction.A cute heart aneurysm, ECG criteria | 2 |
| 23 |  ST segment depression and inversion of T wave as the main ECG criteria of Q–negative myocardial infarction. "Silent" ischemia . | 2 |
| 24 | Functional load samples are the "golden standard" of ECG diagnostic of angina attack in chronic coronary heart disease. | 2 |
| 25 | The concept of acquired heart defects. Hypertrophy of the ventricular and atrium myocardium  Variability of ECG signs of the combined mitral heart defect depending on the predominance of stenosis or insufficiency. | 2 |
| 26 | The main ECG criteria of the acute pulmonary heart disease |   |
| 27 | Influence of concomitant damage of subepicardial layers of myocardium during pericarditis. Differential diagnosis of ECG changes in acute pericarditis and Qis a positive myocardial infarction. | 2 |
| 28 | Electrocardiogram for myocarditis | 2 |
| 29 | ECG differences between secondary symptomatic cardiomyopathies. | 2 |
| 30 | Features of the ECG picture in electrolyte disorders, such as hyper- and hypokalemia and hyper- and hypocalcemia | 2 |
| Only hours of practical classes | **60** |

Individual tasks

Writing the abstracts (with multimedia presentations). Requirements: the presence of all structural units, appropriate design, expression of opinion in the conclusions, processing of at least 6 sources of literature, public protection of the main provisions, the presence of media coverage.

Approximate topics of the abstacts

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| 1 | Criteria for the validity of setting an artificial pacemaker in SSN syndrome |
| 2 | Mechanism re-entry as a trigger for the formation of heterotopic cycles and rhythms. |
| 3 | Clinical case of Morhany-Adams-Stokes syndrome in patients with heart conductivity disorders |
| 4 | Frederyk phenomenon in gerontology |
| 5 | ECG pattern in Brugad syndrome |
| 6 | The presence of "Kent pathways" in WPW syndromeas a cause ofheterotopic rhythm disturbments |
| 7 | What did the patron Dante Alligieri die from, or the symptoms of digitis poisoning |

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| 2 | Механізм re-entry як тригер формування гетеротопних циклів і ритмів, переважно не пов’язаних з порушеннями автоматизму |
| 3 | Клінічний випадок синдрому Морганʼї-Адамса-Стокса у хворих з порушеннями провідності серця |
| 4 | Феномен Фредеріка в геронтології |
| 5 | ЕКГ-патерн при синдромі Бругада |
| 6 | Наявність «шляхів Кента» при синдромі WPWяк причина гетеротопнихпорушень ритму |
| 7 | Від чого помер покровитель Данте Аліг’єрі, або симптоми отруєння дигіталісом  |

**Discipline policy and values**

To achieve the goals of training and successfully complete the course, you must:

1) From the first day to join the work.2) Attend lectures regularly.3) Read the material in advance, before its consideration in a practical lesson.4) Do not be late and do not miss classes.5) Come to the department dressed in a medical gown, in changeable shoes, have a phonendoscope, notebook, pen.6) Perform all necessary tasks and work every day.7) Be able to work with a partner or in a group.8) Ask for help and get it if necessary.

**Academic mobility, interchangeability of credit credits** (volume of 1 credit 30 hours) is provided.Students have the right to discuss various tasks, but their performance is strictly individual.It is strictly forbidden to write down, use any software, tips, mobile phone, tablet or other electronic gadgets during the lesson. If a student is noticed to be written off in a practical lesson, the teacher has the right to remove him from the classroom with a grade in the journal "unsatisfactory", the order of which is identical to the practice of missed classes.

Students with special needs must meet with the teacher in advance or warn him before the start of classes, at the request of the student it can be done by the head of the group.The program of the discipline provides for the calculation of incentive points for participation in student scientific conferences, competitions, research, writing articles in scientific journals in the amount of 3 to 20 points per semester, but only if the total number of points for the discipline does not exceed 200 points.

In case of changes in the syllabus, the current version will be available on the discipline page in Moodle, indicating the date of the last edit.

**Evaluation policy**

Organization of current control.

Assimilation of the topic (current success) is controlled in a practical lesson in accordance with specific goals. The following tools are used to assess the level of preparation of students: computer tests, solving situational problems, monitoring the acquisition of practical skills, the current survey. The final lesson (SO) must be conducted in accordance with the curriculum during the semester on a schedule, during classes. Acceptance of software is carried out by the teacher of the academic group. Assessment is carried out according to the traditional 4-point system: "excellent", "good", "satisfactory" and "unsatisfactory". The final score for the current learning activity (PND) and the final classes (PZ) is defined as the arithmetic mean of the traditional grades for each class and PZ, rounded to 2 decimal places and converted into a multi-point scale in accordance with Table 2.

The minimum number of points that a student must score for the current activity during the study of the section is 120 points, the maximum number of points - 200 points.

Assessment of students' independent work.

 Independent work of students, which is provided by the topic of the lesson along with the classroom work, is assessed during the current control of the topic in the relevant lesson.

Assessment of individual student tasks is carried out under the conditions of the teacher's tasks (report of the abstract in a practical lesson). Points (not more than 10) are added as incentives. The total amount of points for the current educational activity may not exceed 200 points.

The organization of the final control - credit. The test is conducted by the teacher of the academic group at the last lesson in the discipline and involves taking into account the IPA and checking the mastering of all topics in the discipline in the form of an interview. The grade is determined in points from 120 to 200 and marked - "credited", "not credited". "Not credited" is given to students who have not completed the program in full (have unsatisfactory grades or unfulfilled academic arrears). , "D", "E") and the traditional system ("satisfactory", "good", "excellent")

4). According to the number of points obtained, the statement of success of students in the discipline and the appendix with the personal account of students who did not meet the requirements of the curriculum of disciplines (F, FX). The FX grade is given to students who were admitted to the test but did not pass it. A grade of F is given to students who are not admitted to the test.

Grade from the discipline. The discipline is studied during the 1st semester, the grade for the discipline is defined as the arithmetic mean of the points for the semester during which the discipline was studied, which are translated into a 200-point ECTS scale (Table 2).

The maximum number of points that a student can score for studying the discipline - 200 points. The minimum number of points is 120 points.

The grade in the discipline is given only to students who have passed all practical classes and tests. If the test is not passed, the dates of rescheduling during the holidays are set, until the beginning of the next semester.

Students who have not been admitted to the test or have not passed it, have the right to liquidate the current account

Students who have not been admitted to the credit or have not passed it, have the right to liquidate the current academic debt and reschedule the credit within the current semester, as well as within the approved schedule for two weeks during winter or summer vacation after completion. semester, or academic year.

Elimination of academic debt. Omissions of practical classes are worked out hour by hour to the teacher of group or the next teacher. Admission and consultations are held by prior arrangement with the teacher of the group, daily from 1500 to 1730 regular teacher, on Saturdays according to the "Regulations on the procedure for students to study" from 07.12.2015 № 415, as well as online on Wednesdays from 1600 to 1730, on Fridays from 1500 to 1730 in Zoom and Moodle networks.

Rules for appealing the assessment. If a student does not agree with the received grade on the topic / section / exam / discipline, he has the right to require re-assessment of his knowledge and skills by a commission consisting of the head of the department responsible for educational work at the department and several teachers.

LIST OF THEORETICAL QUESTIONS FOR PREPARATION FOR THE CREDIT

• Membrane theory of the origin of cardiac biopotentials.

• Basic heart functions.

• Main teeth, segments and intervals on a normal electrocardiogram.

• General scheme of ECG interpretation.

• General classification of cardiac arrhythmias.

• Pathogenetic mechanisms of arrhythmia formation.

• The main electrocardiographic signs of sinus arrhythmias.

• Slow and accelerated ectopic rhythms and complexes.

• Different forms of extrasystole and their reflection on the electrocardiogram.

• The most characteristic ECG signs of atrial, ventricular and atrioventricular forms of paroxysmal tachycardia.

• Illustration on the electrocardiogram of the correct and incorrect forms of atrial fibrillation.

• The most characteristic ECG criteria for atrial fibrillation.

• Ventricular fibrillation and fibrillation as an emergency.

• The concept of heart block.

• Differential diagnosis of degrees of atrioventricular block according to the interpretation of the electrocardiogram.

• Morhany-Adams-Stokes syndrome as a clinical syndrome - "satellite" AV-blockade.

• Variability of ECG forms of the ventricular complex during blockade of the legs of the His bundle.

• The concept of incomplete block the bundle of His

• Factors of variability of electrocardiographic changes found in hypertrophy of different parts of the heart.

• Electrocardiographic manifestations of acute myocardial ischemia of different localization.

• Differential diagnostic ECG criteria for ischemic injury and myocardial necrosis.

• Dynamics of ECG signs depending on the stages of Q-positive heart attack.

• Topical ECG diagnosis of myocardial infarction.

• Electrocardiographic criteria for angina pectoris in chronic ischemic heart disease.

• The concept of acquired heart disease.

• Basic electrocardiographic criteria of acute pulmonary heart.

• Differential diagnosis of ECG changes in acute pericarditis and Q-positive myocardial infarction.

• Differential diagnosis of ECG changes in acute myocarditis and small focal myocardial infarction.

• ECG differences between secondary symptomatic cardiomyopathies.

• Features of the ECG picture in electrolyte disturbances.