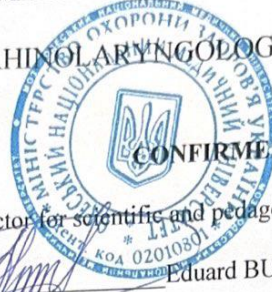


MINISTRY OF HEALTH OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY
Department of OTORHINOLARYNGOLOGY



CONFIRMED by
Vice-rector for scientific and pedagogical work
Eduard BURIACHKIVSKYI
September 1st, 2023

WORKING PROGRAM IN THE ELECTIVE DISCIPLINE
«Modern methods of hearing research and hearing aids»

Level of higher education: second (master's degree)

Field of knowledge: 22 «Health care»

Specialty: 222 «Medicine»

Educational and professional program: Medicine

2023

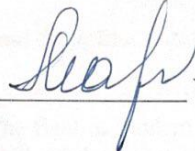
The working program is compiled on the basis of the educational and professional program "Medicine" for the training of specialists of the second (master's) level of higher education in the specialty 222 "Medicine" of the field of knowledge 22 "Health care", approved by the Academic Council of ONMedU (minutes No. 8 dated 29/06/2023).

Authors:

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The working program is approved at the meeting of the Department of Otorhinolaryngology
Minutes No. 1 dated 30/08/2023.

Head of the department  Sergiy Pukhlik

Approved by the guarantor of the educational and professional program  Valeriia MARICHEREDA

Approved by the subject-cycle methodological commission for surgery of ONMedU
Minutes No. 1 dated 30/08/2023.

Head of the subject-cycle methodological commission for surgery of ONMedU

 Vasil Mishchenko

Revised and approved at the meeting of the Department of Otorhinolaryngology
Minutes No. 1 dated 28/08/2024.

Head of the department  Sergiy Pukhlik

Revised and approved at the meeting of the Department of Otorhinolaryngology
Minutes No. __ dated __/__/20__.

Head of the department _____ Sergiy Pukhlik

1. Description of the discipline:

Name of indicators	Field of knowledge, specialty, specialization, level of higher education	Characteristics of the discipline
Total number:	Field of knowledge 22 «Health care»	<i>Full-time (day) education</i> <i>Elective discipline</i>
Credits of ECTS: 3	Specialty 222 «Medicine»	<i>Course: 6</i>
Hours: 90	Level of higher education second (master's degree)	<i>Semester: XI - XII</i> <i>Lectures (0 hours)</i>
Content modules: 1		<i>Seminars (0 hours)</i> <i>Practical classes (30 hours)</i> <i>Laboratories (0 hours)</i> <i>Independent work (60 hours)</i> <i>including individual tasks (0 hours)</i> <i>Form of final control – Credit</i>

2. The purpose and tasks of the educational discipline, competencies, program learning outcomes

Purpose: Acquisition by the student of higher education of knowledge and formation of elements of professional competences in the field of modern methods of hearing research and hearing prosthesis and improvement of skills and competences acquired during the study of previous disciplines.

Task:

1. Formation of skills and abilities: from differential diagnosis, the most common hearing disorders.
2. Improving the skills of substantiating a clinical diagnosis, drawing up a plan for laboratory and instrumental research,
3. Mastering the ability to determine the tactics of emergency care, treatment and rehabilitation of the most common ear diseases.

The process of studying the discipline is aimed at forming elements of following competencies:

Integral competence (level 7) according to the requirements of the NRC. The ability to solve typical and complex problems, including those of a research and innovation nature in the field of medicine. Ability to continue learning with a high degree of autonomy.

General competences according to the requirements of the NRK

GC1. Ability to abstract thinking, analysis and synthesis

GC3. Ability to apply knowledge in practical situations

GC4. Knowledge and understanding of the subject area and understanding of professional activity

GC5. Ability to adapt and act in a new situation

GC6. Ability to make informed decisions

GC7. Ability to work in a team

GC10. Ability to use information and communication technologies

Special (professional, subject) competences

SC1. Ability to collect medical information about the patient and analyze clinical data

SC2. Ability to determine the necessary list of laboratory and instrumental studies and evaluate their results

SC3. Ability to establish a preliminary and clinical diagnosis of the disease

SC4. The ability to determine the necessary regime of work and rest in the treatment and prevention of diseases

- SC5. The ability to determine the nature of nutrition in the treatment and prevention of diseases
- SC6. Ability to determine the principles and nature of treatment and prevention of diseases
- SC7. Ability to diagnose emergency conditions
- SC8. Ability to determine tactics and provide emergency medical care help
- SC9. Ability to carry out medical evacuation measures
- SC11. Ability to solve medical problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility, including early intervention systems
- SC17. The ability to assess the impact of the environment, socio-economic and biological determinants on the state of health of an individual, family, population
- SC25. Adherence to professional and academic integrity, to be responsible for the reliability of the obtained scientific results
- SC26. The ability to determine the management tactics of persons subject to dispensary supervision
- SC27. The ability to diagnose and determine the management tactics of patients with extrapulmonary and widespread forms of tuberculosis, including co-infection of TB/HIV with a chemoresistant course

Program learning outcomes (PLO):

- PLO1. Have thorough knowledge of the structure of professional activity. To be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy.
- PLO2. Understanding and knowledge of fundamental and clinical biomedical sciences, at a level sufficient for solving professional tasks in the field of health care.
- PLO3. Specialized conceptual knowledge that includes scientific achievements in the field of health care and is the basis for conducting research, critical understanding of problems in the field of medicine and related interdisciplinary problems, including the system of early intervention.
- PLO4. Identify and identify leading clinical symptoms and syndromes (according to list 1); according to standard methods, using preliminary data of the patient's history, data of the patient's examination, knowledge about the person, his organs and systems, establish a preliminary clinical diagnosis of the disease (according to list 2).
- PLO5. Collect complaints, anamnesis of life and diseases, assess the psychomotor and physical development of the patient, the state of organs and systems of the body, based on the results of laboratory and instrumental studies, evaluate information regarding the diagnosis (according to list 4), taking into account the age of the patient.
- PLO6. To establish the final clinical diagnosis by making a reasoned decision and analyzing the received subjective and objective data of clinical, additional examination, carrying out differential diagnosis, observing the relevant ethical and legal norms, under the control of the head physician in the conditions of the health care institution (according to the list 2).
- PLO7. Assign and analyze additional (mandatory and optional) examination methods (laboratory, functional and/or instrumental) (according to list 4), patients with diseases of organs and body systems for differential diagnosis of diseases (according to list 2).
- PLO8. Determine the main clinical syndrome or symptom that determines the severity of the condition of the victim/injured person (according to list 3) by making a reasoned decision about the person's condition under any circumstances (in the conditions of a health care facility, outside its borders), including in conditions of emergency and hostilities, in field conditions, in conditions of lack of information and limited time.
- PLO9. Determine the nature and principles of treatment (conservative, operative) of patients with diseases (according to list 2), taking into account the age of the patient, in the conditions of a health care institution, outside its borders and at the stages of medical evacuation, including in field conditions, on the basis of a preliminary clinical diagnosis, observing the relevant ethical and legal norms, by making a reasoned decision according to existing algorithms and standard schemes, in case of the need to expand the standard scheme, be able to substantiate personalized recommendations under the control of the head physician in the conditions of a medical institution.
- PLO10. Determine the necessary mode of work, rest and nutrition on the basis of the final clinical diagnosis, observing the relevant ethical and legal norms, by making a reasoned decision according to existing algorithms and standard schemes.
- PLO14. Determine tactics and provide emergency medical care in emergency situations (according to list

3) in limited time conditions according to existing clinical protocols and standards of treatment.

PLO17. Perform medical manipulations (according to list 5) in the conditions of a medical institution, at home or at work based on a previous clinical diagnosis and/or indicators of the patient's condition by making a reasoned decision, observing the relevant ethical and legal norms.

PLO18. To determine the state of functioning and limitations of a person's vital activities and the duration of incapacity for work with the preparation of relevant documents, in the conditions of a health care institution, based on data about the disease and its course, peculiarities of a person's professional activity, etc. Maintain medical documentation regarding the patient and the contingent of the population on the basis of regulatory documents.

PLO21. Search for the necessary information in the professional literature and databases of other sources, analyze, evaluate and apply this information.

PLO32. The ability to diagnose and determine the management tactics of patients with extrapulmonary and common forms of tuberculosis, including co-infection of TB/HIV with a chemoresistant course.

As a result of studying the discipline, the student has to

Know:

Clinical anatomy of the ear, etiology, clinic of the most common ear diseases, modern methods of diagnosis of hearing disorders, basics of hearing aids.

Be able:

- Communicate with patients, collect complaints, life anamnesis and diseases.
- Assess the state of the ENT organs in normal conditions and in various types of pathology.
- Conduct clinical examination of ENT patients according to standard methods.
- Carry out differential diagnosis and substantiate the clinical diagnosis.
- To determine the nature and principles of providing assistance to patients on the basis of a preliminary clinical diagnosis, observing relevant ethical and legal norms, by making a reasoned decision according to existing algorithms and standard schemes.
- Keep medical documentation in case of hearing impairment.

3. The content of the educational discipline

Theme 1. Clinical anatomy of the external and middle ear. Clinical anatomical structure of the auditory system: external, middle ear.

Theme 2. Clinical anatomy of the inner ear and cochlea. Anatomical structure of the auditory system: inner ear. Auditory centers of the brain.

Topic 3. The emergence of sounds, their main characteristics. Sound. Physical and physiological perception of sound. Sound wave, its properties. Features of sound propagation in space. Characteristics of speech signals. Laws of absorption and reflection in the activity of the sound-conducting system. Impedance and resonance. Basic audiometric units. The concept of frequency range. Area of auditory perception.

Topic 4. Physiology of the auditory system. Physiological structure of the auditory system. The sound-conducting part of the auditory system: the main function. The sound-receiving department of the auditory system. Properties of the auditory analyzer. Mono- and binaural hearing. The ability to differentiate sound by strength and frequency.

Topic 5. Development of the human auditory system in ontogenesis. Classification of hearing disorders. Development of auditory perception and behavioral reactions to sounds, main stages.

Topic 6. Subjective methods of hearing assessment. Hearing research in whispered and spoken language. Hearing research using tuning forks. Hearing passport.

Topic 7. Audiometry. Tone threshold audiometry. Ways of masking. Types of audiograms for disorders of the sound-conducting and sound-receiving departments. Methods of determining the degree of hearing loss. The concept of "phenomenon of accelerated increase in volume" (FUNG). The method of determining the differential threshold of sound frequency. Methods of determining auditory adaptation. Speech audiometry.

Topic 8. Impedance measurement. Tympanometry, determination of auditory reflexes. Types of tympanograms depending on ear pathology.

Topic 9. Objective methods of hearing assessment. Method of registration of evoked otoacoustic emission.

Topic 10. Auditory evoked potentials of the brain. Types, use in children's surdological practice. Newborn screening.

Topic 11. Causes of hearing disorders. Diseases of the external ear. Acute chronic purulent otitis media. Diseases of the inner ear: sensorineural hearing loss, Meniere's disease, otosclerosis, secretory otitis media.

Topic 12. Hearing aids. Earbud. Hearing aid. The main components of a hearing aid.

Classification of hearing aids. Analog hearing aids: traditional, automatic, programmable. Digital hearing aids Pocket, behind-the-ear, in-the-ear (ITE, ITC, CIC), in-glass, implantable hearing aids. The main characteristics of hearing aids: the maximum level of the output signal and the maximum acoustic gain. Setting the parameters of hearing aids. Ear insert, classification, main types.

Topic 13. General principles of hearing aids. Basic concepts of hearing aids. Physiological principles of early hearing aids.

Topic 14. Peculiarities of hearing prostheses in children. Basics of hearing prostheses for young children.

Topic 15. The essence of cochlear and brainstem implantation. Cochlear implantation as a type of hearing aid. From the history of the question. Physiological principles of cochlear implantation. Structure of cochlear implants. The principle of operation of implants. Expediency and principles of brainstem implantation.

Credit. It is evaluated on a two-point scale: the grade "credited" is given to a higher education applicant who has completed the curriculum of the discipline, has no academic debt; the level of competence is high (creative); the grade "failed" is given to a student of higher education who has not completed the curriculum of the discipline, has academic debt (average grade below 3.0 and/or missed classes); the level of competence is low (receptive-productive).

4. The structure of the educational discipline

Theme	Hours					
	Total	including				
		lectures	Seminars	Practical	Laboratory	ISW
Theme 1. Clinical anatomy of the external and middle ear.	6	0	0	2	0	4
Theme 2. Clinical anatomy of the inner ear and cochlea.	6	0	0	2	0	4
Theme 3. Physiology of the auditory system.	6	0	0	2	0	4
Theme 4. Development of the human auditory system in ontogenesis.	6	0	0	2	0	4
Theme 5. The emergence of sounds, their main characteristics.	6	0	0	2	0	4
Theme 6. Causes of hearing disorders.	6	0	0	2	0	4
Theme 7. Subjective methods of hearing examination	6	0	0	2	0	4
Theme 8. Audiometry.	6	0	0	2	0	4
Theme 9. Impedance	6	0	0	2	0	4

measurement.						
Theme. 10. Objective methods of hearing examination.	6	0	0	2	0	4
Theme 11. Auditory evoked potentials of the brain.	6	0	0	2	0	4
Theme 12. Hearing aids.	6	0	0	2	0	4
Theme 13. General principles of hearing aids.	6	0	0	2	0	4
Theme 14. The essence of cochlear implantation.	6	0	0	2	0	4
Theme 15. Diagnostic examination and selection of patients for surgery and postoperative rehabilitation.	6	0	0	2	0	4
Credit	0	0	0	0	0	0
<i>Individual task</i>	0	0	0	0	0	0
Total	6	0	0	30	0	60

5. Themes of lectures / seminars / practical classes/ laboratories

5.1. Themes of lectures -lectures are not provided

5.2. Themes of seminars-Seminars are not provided.

5.3. Themes of practical classes

№	THEME	Hours
1.	Clinical anatomy of the external and middle ear.	2
2.	Clinical anatomy of the inner ear and cochlea.	2
3	Physiology of the auditory system.	2
4	Development of the human auditory system in ontogenesis.	2
5	The emergence of sounds, their main characteristics.	2
6	Causes of hearing disorders.	2
7	Subjective methods of hearing examination	2
8	Audiometry.	2
9	Impedance measurement.	2
10	Objective methods of hearing examination.	2
11	Auditory evoked potentials of the brain.	2
12	Hearing aids.	2
13	General principles of hearing aids.	2
14	The essence of cochlear implantation.	2
15	Diagnostic examination and selection of patients for surgery and postoperative rehabilitation.	2
	Total hours	30

5.4. Themes of laboratoriesLaboratories are not provided.

6. Independent work of the student

No.	Theme	Hours
1.	Topic 1-15. Preparation for practical classes	4
	Total	60

7. Teaching methods

Practical classes: conversation, solving clinical situational problems, practicing patient examination skills, practicing skills, instructing and practicing skills on simulation dummies, training exercises on differential diagnosis of the most common hearing defects.

Independent work: independent work with recommended basic and additional literature, with electronic information resources, independent mastering of communication algorithms with ENT patients.

8. Forms of control and assessment methods

(including criteria for evaluating learning outcomes)

Current control: oral survey, testing, assessment of class activity.

Final control: Credit. It is evaluated on a two-point scale: the grade "credited" is given to a higher education applicant who has completed the curriculum of the discipline, has no academic debt; the level of competence is high (creative); the grade "failed" is given to a student of higher education who has not completed the curriculum of the discipline, has academic debt (average grade below 3.0 and/or missed classes); the level of competence is low (receptive-productive).

Evaluation of the current educational activity in a practical session:

1. Evaluation of theoretical knowledge on the subject of the lesson:

- methods: survey, solving a situational clinical problem
- maximum score – 5, minimum score – 3, unsatisfactory score – 2.

The grade for one practical lesson is the arithmetic average of all components and can only have a whole value (5, 4, 3, 2), which is rounded according to the statistical method.

Criteria of ongoing assessment at the practical class

Score	Assessment criterion
Excellent «5»	The student is fluent in the material, takes an active part in discussing and solving a situational clinical problem, confidently demonstrates practical skills during the examination of a patient and the interpretation of clinical, laboratory and instrumental research data, expresses his opinion on the topic of the class, demonstrates clinical thinking.
Good «4»	The student has a good command of the material, participates in the discussion and solution of a situational clinical problem, demonstrates practical skills during the examination of a patient and the interpretation of clinical, laboratory and instrumental research data with some errors, expresses his opinion on the topic of the class, demonstrates clinical thinking.
Satisfactory «3»	The student does not have sufficient knowledge of the material, is unsure of participating in the discussion and solution of the situational clinical problem, demonstrates practical skills during the examination of the patient and the interpretation of clinical, laboratory and instrumental research data with significant errors.
Unsatisfactory «2»	The student does not possess the material, does not participate in the discussion and solution of the situational clinical problem, does not demonstrate practical skills during the examination of the patient and the interpretation of clinical, laboratory and instrumental research data.

The student is admitted to the credit on the condition that the requirements of the educational program are met and if he received at least 3.00 points for the current educational activity.

9. Distribution of points, obtained by the student

The grade for the discipline consists of 50% of the grade for the current academic

performance.

The average grade in the discipline is converted to the national grade and converted to points on a multi-point scale (200-point scale).

Conversion of traditional assessment into 200-point is carried out by the information and technical department of ONMedU by the special program by the formula:

Average score (current academic performance) x 40.

Conversion table of traditional to multi-point

National score for the discipline	The sum of scores for the discipline
Excellent («5»)	185 – 200
Good («4»)	151 – 184
Satisfactory («3»)	120 – 150
Unsatisfactory («2»)	Less than 120

According to the ECTS rating scale, students' achievements in educational discipline, who study on the same course of one specialty, according to their scores, are assessed by means of rank, namely:

Conversion of the traditional evaluation and ECTS scores

Score on the ECTS scale	Statistical indicator
A	The best 10% students
B	Next 25% students
C	Next 30% students
D	Next 25% students
E	Next 10% students

10. Methodological support

- Working program in the discipline
- Syllabus
- Methodological recommendations for the practical classes in the discipline
- Methodological recommendations for the individual work of students
- Multimedia presentations
- Situational tasks (including calculation)

Educational and methodical literature:

Brad A. Stach, Virginia Ramachandran. *Clinical Audiology: An Introduction*: Plural Publishing, 3rd Edition. 2021. Pp. 1-645.

11. Questions for the final control

1. Clinical anatomy of the tympanic membrane. Features of the location and structure of the tympanic membrane in young children.
2. Clinical anatomy of the tympanic cavity.
3. Clinical anatomy, physiology of the auditory tube. Peculiarities of its structure in childhood.
4. Clinical anatomy of the inner ear.
5. The structure of the spiral organ. Adequate stimulus of the auditory analyzer.
6. Mechanism of sound conduction (transmission, transformation of sound).
7. Theories of sound perception.
8. Development of the human auditory system in ontogenesis.
9. Classification of hearing disorders.
10. The emergence of sounds, their main characteristics.
11. Causes of hearing disorders.
12. Study of hearing in language.
13. Tuning methods of hearing research.
14. Audiometry.
15. Impedance measurement.
16. Otoacoustic emission.

17. Auditory evoked potentials of the brain.
18. Types of hearing aids.
19. Types of ear plugs.
20. General principles of hearing aids.
21. Peculiarities of hearing aids in children.
22. The essence of cochlear implantation.
23. Diagnostic examination for cochlear prosthetic surgery.
24. Selection of patients for surgery and postoperative rehabilitation.

12. Recommended literature

Basic:

1. Y.Mitin, Y.Deyeva, Y.Gomza, V. Didkovskiy etc. Otorhinolaryngology// Medicine, 2018. – 264p.
2. Brad A.Stach, Virginia Ramachandran. Clinical Audiology: An Introduction: Plural Publishing, 3rd Edition. 2021. Pp. 1-645.
3. Jack Katz. Handbook of Clinical Audiology Seventh, North American Edition. 2021. Pp. 1-992.
4. Geoffrey Cooling.The Little Book of Hearing Aids. 2020. Pp. 1-256.

Additional:

5. P.W.Flint, B.H.Haughey, V.J.Lund, K.T.Robbins, J.R.Thomas, M.M.Lesperance, H.W.Francis. Cummings Otolaryngology: Head and Neck Surgery, 3-Volume Set// Format Hardback, 2020. – 3568
6. Z.Mu, J.Fang. Practical Otorhinolaryngology, Head and Neck Surgery: Diagnosis and Treatment// Hardback, 2020. - 314 p.
7. S.N.Kumar.Clinical Cases In Otolaryngology// Paperback, 2020. – 260p.
8. R.Pasha, J.S.Golub. Otolaryngology-Head and Neck Surgery : Clinical Reference Guid// Paperback, 2019. - 800 p.
9. J. A.Seikel, D.G.Drumright, D.J.Hudock. Anatomy and Physiology for Speech, Language, and Hearing //Format Hardback, 2019. - 700 p.
10. K.S.Helfer, E.L.Bartlett, A.N.Popper, R.R.Fay. Aging and Hearing: Causes and Consequences// Hardback. 2020. – 326p.

13. Electronic information resources

1. World Health Organization. URL: www.who.int/ru/index.html.
2. European Regional Office of the World Health Organization. URL: www.euro.who.int.
3. www.ama-assn.org – American Medical Association
4. www.dec.gov.ua/mtd/home/ - State Expert Center of the Ministry of Health of Ukraine
5. <http://bma.org.uk>– British Medical Association
6. www.gmc-uk.org- General Medical Council (GMC)
7. www.bundesaerztekammer.de – German Medical Association