Preparation for the written exam within the aptitude test

M.Sc. Health Science – Prevention and Health Promotion

Content

General information

The test in written form lasts 90 minutes. The date of the test will be announced by the commission at least one week in advance. The test takes place twice per application phase. There is a regular date and a subsequent date. Participation in the subsequent date is only possible in proven justified exceptional cases.

The content of the test covers the following topics with approximately the specified distribution:

- Research Methods (30%)
- Epidemiology (15%)
- Life science/Medicine (15%)
- Psychology/Social Sciences (15%)
- Health management and policy (15%)
- Public Health (10%)

In the following, you will find the respective expected skills, main subjects, literature references and one sample question for the individual topics to help you prepare for the test.

Research Methods

Expected skills

Students are able to:

- understand the theoretical foundations of empirical science, especially the concepts of operationalization, reliability, validity and bias
- describe the different empirical research designs
- describe and interpret descriptive statistical measures
- describe and interpret simple association measures
- describe sampling strategies and understand the rationale of random sampling
- understand basics of probability theory, the concept of random variables and important distributions
- understand and apply the concepts of point and interval estimators
- understand and apply parametric and non-parametric tests for the examination of differences and associations and to understand the limitations of these concepts
- apply basic concepts of linear regression and interpret regression results
- understand and apply basic operations on the above-mentioned statistical topics

Subjects

1. Statistics

   - Absolute and relative frequencies
   - Measures of location and scale
   - Measures of association
   - Basics in probability theory and random variables
   - Epidemiological measures
   - Confidence intervals
   - Statistical hypothesis testing
   - Anova
   - Linear regression

2. Experimental Design

   - Basics of philosophy of science
   - Measuring and operationalization
   - Reliability and validity
   - Research designs
   - Experimental design
   - Study protocol
   - Research process
   - Confounding
   - Sampling
   - Data collection

3. Further research methods

   - Good scientific practice
   - Sound scientific conduct
   - Data sources in research
   - Study design
   - Bias and Confounding
   - Interpretation of research findings

Recommended Literature

Heumann, C., Schomaker, M., Shalabh: Introduction to Statistics and Data Analysis, Springer, 2016 (https://link.springer.com/book/10.1007/978-3-319-46162-5)

Celentano D, Szklo M.: Gordis Epidemiology. Elsevier, 2018, 6. Edition (https://shop.elsevier.com/books/gordis-epidemiology/celentano/978-0-323-55229-5)

Sample question

"In a randomized trial, after treatment with a medication or a placebo the cholesterol value is measured for all participants. We assume the cholesterol values to be normally distributed. Which of the following methods can be used to analyse, whether the cholesterol values differ between trial group and placebo group?"

A. Two-sample t-test
B. X^2 test
C. Pearson correlation
D. Sensitivity
E. Odds ratio

Epidemiology

Expected skills

Students are able to:

- understand basic concepts, methods and issues in the fields of epidemiology and public health
- calculate and interpret key indicators of epidemiology
- relate to the causes and consequences of health-related conditions and events in populations
- deal with health effects and preventive measures
- understand principles of causality in the development of diseases
- differentiate characteristics, use and limitations of epidemiological study designs

Subjects

- Ethics in scientific research
- Good scientific practice,
- Sound scientific conduct
- Study designs
- Concepts of causality
- Concepts of bias and confounding
- Epidemiological measures (prevalence, incidence, mortality, lethality, odds ratio, relative risk, standardized mortality ratio, standardized incidence ratio, hazard ratio, numbers needed to treat, numbers needed to harm)
- Synthesis of evidence: Basic concepts of systematic reviews and meta-analyses
- Assessment of quality in scientific research

Recommended Literature

Celentano D, Szklo M.: Gordis Epidemiology. Elsevier, 2018, 6. Edition (https://shop.elsevier.com/books/gordis-epidemiology/celentano/978-0-323-55229-5)

Sample question

"What could be the reasons for a non-significant result of an epidemiological study? Which statement is wrong?"

A. There is actually no association
B. **The study was too large to find an association.**
C. The study was too small and the association was not found.
D. The study contained errors.
E. The wrong measure of association was calculated.

Life science/Medicine

Expected skills

Students are able to:

- understand the structure, development and function of the human body as well as individual specific organ systems. Describe them and furthermore apply them to specific issues of biomedicine of the body.
- understand pathogenesis, manifestations, therapy and prognosis of common, individually and economically significant clinical pictures of internal medicine, general medicine and orthopedics
- understand preventive and rehabilitative measures in the field of orthopedics and internal medicine
- name the major joints of the human body and the muscles of the large joints and their function in Latin
- describe basic conservative treatment options for individual diseases
- reproduce basic knowledge of biochemistry and metabolism
- reproduce basic knowledge of enzyme regulation

Subjects

- Basic anatomical terms (planes and axes, direction of motion, positional designations)
- Structure and functioning of the cell and tissues.
- Structure and function of the musculoskeletal system and physiological functioning.
- Structure and function of the cardiovascular system (heart and blood vessels), blood and defense system, lymphatic system, respiratory tract.
- Structure and functioning of the endocrine system, digestive system, genitourinary system, central nervous system.
- Common clinical pictures, pathophysiology, diagnostics and therapy in internal medicine and general medicine and orthopedics, generally referred to as diseases of civilization: cardiovascular diseases, metabolic diseases, cancer
- Biochemical basis of metabolism, fluid hormones, macronutrient structures and functions, digestion and absorption, major nutrient-related metabolic pathways
- Injuries, diseases, diagnostic testing and forms of treatment of the musculoskeletal system
- Citrate cycle, enzyme regulation, gluconeogenesis, osmoregulation
- Normal heart rate, stroke volume and blood pressure
- Liver function

Recommended Literature

Silbernagl, S. & Despopoulos, A. (2015). Color atlas of Physiology (English edition). Thieme.

Standring, S. (Ed.) (2008). Gray's Anatomy: The Anatomical Basis of Clinical Practice. Churchill Livingstone, Elsevier.

Jameson, J. L., Fauci, A. S., Kasper, D. L., Hauser, S. L., Longo, D. L., Loscalzo, J. (Eds.) (2018). Harrison´s Principles of Internal Medicine. McGraw-Hill Education.

Sample question

"Which statement about the liver is correct?
The liver...

1) ... is involved in protein metabolism.
2) ... is involved in the metabolism of carbohydrates.
3) ... is involved in lipid metabolism.
4) ... is involved in the breakdown of toxins.

5) ... is the largest gland in the body."

A. All statements are correct.
B. Only statements 1, 2 and 3 are correct.
C. Only statements 4 and 5 are correct.
D. Only statements 2, 4 and 5 are correct.
E. Only statements 1, 3 and 4 are correct.

Psychology/Social Sciences

Expected skills

<u>Psychology:</u>

Students are able to:

- define and describe key terms from psychology
- explain different types of memory systems and describe the major theories of behavioral learning
- describe and compare key terms and theories of motivation and self-regulation
- explain the terms health and disease based on a biopsychosocial perspective and differentiate from the biomedical model
- explain psychological theories and models for the development and promotion of health-related behavior
- describe central theories and models for the development of stress and mental health disorders
- describe central principles of different forms of mental health prevention

<u>Social Sciences:</u>

Students are able to:

- define and describe key terms from sociology and social health science research
- understand how to deal with diversity as a social field of action
- present the fundamentals of social science theories regarding diversity and inclusion, and to transfer them to concrete practice fields, in particular that of health organizations and institutions
- grasp and critically assess the role of organizations, settings, socio-economic framework conditions and diversity-related factors in the production or reduction of social and health inequalities
- evaluate the influence of diversity on the health care sector (e.g. strengths of a diversified health care workforce, challenges of dealing with a more diverse spectrum of patients, intercultural competence and skill acquisition)
- conduct a critical reflection of societal practices and categorizations along diversity categories (gender, race, age, class, dis-/ability) from a diversity theory perspective
- understand how these categorizations and their effects on societies create different participation opportunities, as well as different life and health chances
- apply central concepts of diversity research to own scientific work
- explain inclusion and exclusion processes in contemporary societies through socio-historical and theoretical perspectives

Subjects

<u>Psychology:</u>

- What is Psychology?
- Fundamentals of Neurophysiology
- Individual Differences and Personality
- Learning
- Memory
- Motivation and Self-Regulation
- Bio-psycho-social understanding of illness/health
- Theories of uptake and maintenance of health-related behavior
- Intervention approaches to changing behaviors, behaviors and lifestyles in different approaches and at different levels
- Theories of stress, stress development and stress management

- Intervention approaches for the prevention of mental health disorders

Social Sciences:

- What is sociology?
- Relationship between migration and health
- Migrants as patients, migrants as health care workers (focus on Germany)
- WHO Ottawa Charter and its core terminology
- Relationship between socio-economic status and health
- Intersectionality
  - types of diversity and inequalities
  - diversity management
  - models of disability

Recommended Literature

Psychology:

Ogden, J. (2019) Health Psychology. 6th Edition, McGraw-Hill Education. Chapters: Chapters 1 Introduction to health psychology: theories and methods; 8 Illness cognitions, 10 Stress and illness

Arango C, et al. Lancet Psychiatry. 2018 Jul;5(7):591-604. doi: 10.1016/S2215-0366(18)30057-9.

Gerrig, R. J., & Zimbardo, P. G. (2018/2020). Psychology and Life. Pearson Higher Education.
Chapter 1: Psychology and Life, Chapter 7: Learning and Behavioral Analysis, Chapter 8: Memory, Chapter 12: Motivation, Chapter 14: Understanding Human Personality

Social Sciences:

Ottawa Charter

Margaret Whitehead & Göran Dahlgren (2006). "Concepts and principles for tackling social inequities in health". https://nccdh.ca/resources/entry/concepts-and-principles-for-tackling-social-inequities-in-health

Steven Vertovec (2015) (ed.). Routledge International Handbook of Diversity Studies. https://www.routledge.com/Routledge-International-Handbook-of-Diversity-Studies/Vertovec/p/book/9780367867904 (Part I, Part III, Part IV)

Anthony Giddens et al. (2020). Introduction to Sociology. https://wwnorton.com/books/9780393538021 (Part I & Part III)

Sample question

"They are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems". This definition refers to..

A. Social Life
B. Personal Environment
C. Social Determinants of Health
D. Health Governance
E. Health Care Providers

Health management and policy

Expected skills

Students are able to:

- reproduce different types of existing health care systems
- explain different forms of financing schemes for health care systems
- explain the German health care system and understand the main differences between the German system and the system in the United States and the United Kingdom; this includes:
  - a basic understanding of the differentiation between the inpatient and the outpatient sector in the German health care system
  - knowledge about responsibilities and shared-decision-making in the German health care system
  - basic understanding of reimbursement mechanisms in the inpatient and outpatient sector in Germany
  - remember and understand structural and governance issues in health care
- remember and understand basic economic theories relevant to health care; this includes:
  - have a fundamental understanding of principles of economics to address problems of health
  - remember and understand when healthcare resources are used efficiently or inefficiently and how this is influenced by the behavior of different actors in the healthcare marketplace.
  - have a fundamental understanding of demand and supply of medical goods and the role of health insurance in this context
  - understand economic concepts of health evaluation and have basic knowledge about different types of economic evaluations in health care
- remember and understand basic management theories, concepts, and applications relevant to health care; this includes:
  - have a fundamental understanding of management principles to address problems of health
  - remember and understand different management functions: strategy, marketing, innovation, product and service management, human resources, financing, investment and cost accounting.
  - management-related problem-solving skills in regard to mastering existing and future challenges in health care

Subjects

- Financing schemes in health care systems
- Reimbursement systems in health care systems
- Organization of inpatient and outpatient sectors
- Health insurance systems
- Incentives in health care systems

Recommended Literature

Breyer, Zweifel and Kifmann (2013): Gesundheitsökonomik, 6. Aufl., Springer

Busse, Blümel and Ognyanova (2013): Das deutsche Gesundheitssystem – Akteure, Daten und Analysen. MWV

The Commonwealth Fund (2020): International Profiles of Health Care Systems, (Tikkanen, R.; Osborn, R.; Nossialos, E.; Djordjevic, A.; Wharton, G. (editors)). Available at: https://www.commonwealthfund.org/international-health-policy-center/system-profiles

Folland, Goodman and Stano (2012): Economics of Health and Health Care, 7th edition, Pearson

Greer (2009): The Politics of European Union Health Policies, Open University Press

McGraw-Hill. Simon (2013): Das Gesundheitssystem in Deutschland. Eine Einführung in Struktur und Funktionsweise, 4. Aufl., Huber

Sample question

"Which of the following statements on health economics and health management as well as their similarities and differences is incorrect?"

A. **Market regulation is a central issue in health management, but not in health economics**
B. Health economics is based on the principles of economics
C. Health management is based on the principles of business administration
D. Both disciplines are dedicated to health care
E. The assessment of health systems as a whole is the task of health economics, but not health management

Public Health

Expected skills

Students are able to:

- Name functions and sub-disciplines of Public Health practice and research
- Name and describe local, national and international Public Health institutions and their tasks
- Understand and explain methodological approaches of Public Health research
- Understand and explain determinants of behavior and health
- Critically appraise policy measures and control mechanisms for prevention and health promotion on national and global level
- Critically reflect on Public Health problems and challenges

Subjects

- Disciplines and activity fields of public health research and practice
- Historical overview on population health and the epidemiologic transition
- Burden of disease and determinants of health
- Concepts of prevention and health promotion
- Local, national and global health policies
- Public health and health systems
- Public health institutions and their functions
- Analysis of selected public health problems in national and international context
- Current challenges in public health practice and research

Recommended Literature

M.J. Schneider. Introduction to Public Health. Jones and Bartlett Learning. 2017

F.W. Schwartz. Das Public Health Buch. Gesundheit und Gesundheitswesen. Urban & Fischer Verlag. 2016

Sample question

"Which statement about Public Health is wrong?"

A. Public health is the science and art of preventing diseases
B. Public health takes a population approach
C. In contrast to global health, public health mainly deals with questions that do not transcend national boundaries
D. Public health is a multidisciplinary approach
E. The goal of public health is to diagnose, treat and cure patients