

**Topics for the Final state examination (FSE)**  
**in the follow-up master's degree study program**  
**N0988P360002 Systemic Integration of Processes in Healthcare**

Pursuant to art. 7 (3) of the Directive of the Dean on implementation of bachelor and master study programs at the Czech Technical University, Faculty of Biomedical Engineering, the Dean, based on the proposal of the Head of the Department, determines the following final state examination thematic groups.

The thematic groups comply with the content of the application approved by the National Accreditation Committee for the accreditation of a two year follow up master study program Systemic Integration of Processes in Healthcare, file N. NAU-177/2017-19 of 24. 1. 2019. The thematic groups are the indispensable minimum knowledge and skills necessary for the labour market success of the graduates of the study program „Systemic Integration of Processes in Healthcare“. In compliance with the accreditation, **all thematic groups are obligatory.**

The final state examination is opened by the defence of the Master Thesis. Exams from three obligatory thematic groups follow. At the beginning of this part, the student draws numbers of three questions (one question from each thematic group). The examiner asks questions, which fall among the drawn thematic group and usually does not cover the entire content of the given thematic group. However, questions which are directly linked to the thematic group or the Master Thesis topic, but which are a part of other closely related thematic group, are not excluded. Additional questions are posed by the committee members, or possibly by a member of the committee, who is determined by the chairman of the committee. The answers immediately follow the questions and they are without written preparation.

**Thematic group SELECTED CHAPTERS IN MEDICINE AND HEALTHCARE**

1. Healthcare systems and their typology. International comparison of healthcare systems (indicators, trends, databases).
2. Czech healthcare system (typology, indicators, parties, strengths and weaknesses), its development since 1989 (main milestones, reforms) and current trends.
3. Public health insurance system. The role and position of health insurance companies in the Czech system.
4. Financing (resources, development) and financial flows within the Czech healthcare system.
5. Types of payment mechanisms and their impact on the behaviour of providers. Current payment mechanisms in the Czech Republic and their pros and cons.
6. Health, determinants of health, preventive programs.
7. Types of medical facilities in the Czech Republic (according to purpose, ownership, legal form, relationship to public healthcare insurance).
8. The system of social insurance and security in the Czech Republic (pension insurance, sickness benefits, state social assistance).
9. Epidemiology of infectious and non-infectious diseases, epidemics, monitoring, measures.
10. Medical registers, principles, overview, importance, application.
11. Protection of personal and sensitive data in health care, fundamentals of healthcare ethics.

12. External checks and inspections in medical facilities (types, authorized persons, authorizations, rights and obligations of both parties).
13. State administration in health care, main administrative authorities and their roles and competencies, impacts on medical facilities.
14. Liability in healthcare, the system of legal regulations in the Czech Republic (with an impact on health care).
15. Classification and definition of extraordinary events and crisis situations. Possible types of threats for the Czech Republic, which may lead to a crisis. Characteristics of crisis situations embodied in the legal order of the Czech Republic and basic rules of their declaration.
16. The essence and importance of an integrated rescue system, governing legal regulations. Main tasks and characteristics of the basic and other components of the integrated rescue system.
17. Individual levels and principles of coordination of component parts of the integrated rescue system in joint intervention. Types of documents that belong to the so-called IRS documentation.
18. Crisis management in health care, method of coordination, key tasks of crisis management bodies and providers of healthcare services in ensuring crisis preparedness of health care. Key legislation.
19. Medical rescue service, management of the medical rescue service, its key tasks, cooperation with other components of the integrated rescue system, medical rescue chain.
20. Tasks of health care in case of threat to the population with CBRN substances, preventive measures, preparedness for possible damage suffered by the population and procedure for dealing with the consequences. Methodology of training medical staff.

### **Thematic group OPERATING MEDICAL FACILITIES**

1. Management of human resources in healthcare. Goals and tasks, current trends in human resources. Leadership styles, leadership, motivation and evaluation of employees.
2. Occurrence of partial market structures in healthcare, issues of public goods, specifics of demand for health care, specifics of healthcare supplies and tools for their rationalization.
3. Remuneration in healthcare. Employment and agreements on work performed outside the employment relationship. Salary, pay.
4. Problems of costs, specifics of costs in health care. Managerial accounting. Calculation. Budgets.
5. Financial statements and their structure. Links between financial statements. Profit. Breakeven point analysis.
6. Financial management of a company. Assessment of financial performance of the company. Leverage. Financial analysis and its methods.

7. Legal forms of business in healthcare, specifics of business in health care. Criteria for choosing the legal form of business. Business plan. Purpose and structure of a business plan. Procedure for the establishment of a non-state medical facility.
8. Investment activity of the company. Importance, methods of assessing the effectiveness of investments. Investment decisions. Ways of financing investments.
9. Managerial functions - decision making. Meritorious, functional and procedural aspects of decision-making. Types of decision-making processes. Group vs. individual decision making. Barriers to decision making.
10. Crisis management and crisis communication. Aim and time frame of crisis management. Crisis plan and the process of its preparation. Principles of crisis communication.
11. Managerial functions - planning and control. The importance of planning. Control and its functions. Controlling and internal audit in medical facilities. Risk analysis in planning.
12. Managerial functions - organizing. Types of organizational structures. Outsourcing. Change management and its position in organizing.
13. Tax issues in healthcare. Income tax (natural and legal persons), VAT in healthcare. Ways of recording the activities of the organization.
14. Optimization approaches in management. Lean management, waste issues in health care. Selected lean management techniques.
15. Health Services Act. Definition of healthcare services, conditions for the provision of health services, patients' rights, informed consent, rights and obligations of healthcare professionals.
16. Use of medical devices. EU Regulation on Medical Devices N.745/2017, Act on Medical Devices, post-market monitoring of medical devices, vigilance, Eudamed.
17. Metrology. Act on Metrology, organization of metrology, types of measuring instruments, set measuring instruments in health care, metrological continuity, ensuring uniformity and accuracy of measuring instruments, metrological hospital rules.
18. Public procurement. Public Procurement Act, investment process, contracting authority and supplier, principles of public procurement, types of public procurement, classification of public procurement, the course of the procurement procedure, instrument and devices committee.
19. Quality assessment. Definition of the term quality, its meaning and current approaches, rules and principles in the quality management system, quality management systems, standards in the field of quality management systems, certification process according to certification standards.
20. Assessment of quality and safety of health services. Internal assessment of quality and safety of health services, external evaluation of quality and safety of health services,

principles of accreditation of medical facilities, quality standards, persons authorized to perform quality and safety evaluation.

### **Thematic group MEDICAL TECHNOLOGY**

1. Monitoring of patient vital functions at Department of Anaesthesiology and Intensive Care/ICU environment. Analysis of individual measured parameters, medical device solution, physiological ranges and limitations of measurements.
2. Instrumentation to ensure patient therapy. Methods of physical therapy - electrotherapy, magnetotherapy, therapeutic ultrasound, cryotherapy. Drug dosing devices. Analysis of individual technical principles, examples of medical device solutions, ensuring safe therapy, limitations of methods.
3. Therapeutic devices in intensive care - devices for artificial lung ventilation, anaesthesiology and resuscitation devices, dialysis. Analysis of individual technical principles, examples of medical devices solutions, ensuring safe therapy, limitations of methods.
4. Cardiac assist medical devices (electrical and mechanical circulatory support). Analysis of individual technical principles, examples of medical devices solutions in the context of specific diagnoses, ensuring safe therapy, limitations of methods.
5. Ultrasound imaging. Analysis of individual technical principles, examples of medical device solutions in the context of specific diagnoses, ensuring safety, method limitations. Hospital information system, its structure and relation to the imaging method. Data standards.
6. X-ray imaging. Analysis of individual technical principles, examples of medical device solutions in the context of specific diagnoses, ensuring safety, method limitations. Hospital information system, its structure and relation to the imaging method. Data standards.
7. Computed tomography. Analysis of individual technical principles, basic principle of image reconstruction, ensuring safety, method limitations. Functional nuclear medicine examination - PET. Analysis of individual technical principles. Hospital information system, its structure and relation to the imaging method. Data standards.
8. Endoscopes and instrumentation of operating theatres. Description of the principles of the function of endoscopic imaging technology, descriptions of technical principles of medical technology in operating rooms and their typical technical parameters and implementation. Hospital information system, its structure and relation to the imaging method. Data standards.
9. Hospital backup power supply. Reason for the use of backup systems, types and technical implementation of backup systems. Orientation in the issue of physical implementation of the medical isolated power system and its benefits. Colour coding of electrical sockets.
10. Medical gases in healthcare. Pressure vessels, source stations, distribution of medical gases. Examples of gases, their properties and practical application in medicine. Orientation in the given issue, including knowledge of safety rules for handling medical gases and pressure vessels.

11. Sterilization and disinfection. Physical provision of sterilization and disinfection. Physical and chemical sterilization - instrumentation, process validation, method limitations.
12. The importance of clean and dirty premises. Importance of filters. Construction layout to ensure an adequate hygienic standard.
13. Technical requirements for products. Act on technical requirements for products, participants in the supply chain and their obligations, compliance with basic requirements, harmonized standards, certification, authorization, accreditation of conformity assessment bodies, notified bodies, Office for standards, metrology and testing.
14. Introducing a medical device to the market. EU Regulation on Medical Devices N. 745/2017, parties to the supply chain and their obligations – specificities of suppliers of medical devices, definition of medical device, classification of medical devices, technical documentation of medical devices, clinical evaluation, conformity assessment.
15. HTA – Assessment of medical technologies. Definition, main principles, application abroad, situation in the Czech Republic.
16. Fundamentals of clinical and economic assessment within HTA. Data requirements, interpretation of results.
17. HTA for medical devices and Hospital-based HTA. Particularities of medical devices compared to other technologies (from the point of view of HTA), examples of application, specific methods, problems of using HTA at the hospital level for medical technology and other technologies.
18. Content of HTA study, Core Model. Characteristics and purpose, structure, application, ethical issues.
19. Quantification of benefits of health technologies. Natural quantities, QALYs and other similar rates, evaluation according to multiple criteria.
20. Evidence-based medicine (EBM) and evidence acquisition for HTA studies (systematic research, meta-analyses, types of clinical trials, basics of modelling).

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