

NATIONAL RESEARCH TOMSK POLYTECHNIC UNIVERSITY

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Director of TPU School of Earth Sciences and
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TPU Vice-rector for Academic Affairs



Artem S. Boev

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2023



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2023



**Admissions Assessment Policies and Procedures
for Master Program “Environmental Engineering and Sustainability”
Field of study 05.04.06 Ecology and Natural Management**

Head of Mater Program
“Environmental Engineering and Sustainability”



Natalia V. Baranovskaya

Tomsk, 2023

OUTLINE

Master Degree program: 05.04.06 Ecology and Natural Management, **specialization** “Environmental Engineering and Sustainability”

Supporting division:

Division for Geology, School of Earth Sciences and Engineering

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The programme for the entrance exams for specialization 05.04.06 Ecology and Natural Management (Master Program “Environmental Engineering and Sustainability”) is developed in compliance with Federal State Standards for Higher Education (bachelor degree studies) and is of interdisciplinary nature.

The objective of the entrance exams is to select all the excellent candidates who apply to study in the chosen program within the specialization: is also enables to facilitate mobility of bachelor graduates who apply to study on master degree programs in the higher education institutions.

GENERAL REQUIREMENTS TO THE ENTRANCE EXAMS PROCEDURE

REGULATIONS AND PROCEDURES

The entrance exams for candidate to master program “Environmental Engineering and Sustainability” within specialization 05.04.06 Ecology and Natural Management are held in the format of an oral interview conducted in English language.

The Examination Board with each of candidates conducts an oral interview individually. A candidate is interviewed with the questions which enable to evaluate the degree of the main engineering skills (general professional skills) development.

No more than 30 minutes is allocated for each candidate’s interview.

The entrance exams in the format of an oral interview conducted by the Examination Board can be organized in special designated sites (in university teaching rooms – examination halls) or via remote exam setting. Under certain conditions, the procedure of conducting the entrance exams via remote exam setting is monitored by an invigilator.

On the day of the entrance exams, the candidates are allowed into a university examination hall where the entrance exams will be held according to the list in which each candidate is assigned the time for an oral interview.

An oral interview with each candidate comprises 4 questions (one question of random choice from each of the topics and themes from the entrance exams programme). The Examination Board can question a candidate with 1-2 additional questions within the topics and themes of the entrance exams programme. The questions addressed to a candidate and the marks are drawn up in the entrance exams report (see Appendix 1). The entrance exams report is drawn up immediately after the entrance exams take place. The entrance exams results are communicated to a candidate by the Examination Board after the Examination Board meeting. A candidate is to put his/her signature in the report.

The procedure for conducting the entrance exams in remote exam setting is regulated by the active procedures and regulations validated by the rector's orders: The Procedures and Regulations of the Entrance Exams for TPU Master Degree Studies and the Procedures and Regulations for the Entrance Exams Conduct.

A candidate has a right of appeal the entrance exams results if a candidate, on stated grounds, considers that the mark assigned in the entrance exam is erroneous and (or) if there is

evidence of substantive irregularity in the conduct of the entrance exam. Such appeals are dealt with in compliance with the Regulations for TPU Board of Appeal validated by the rector's order.

ASSESSMENT: MARKS AND DESCRIPTORS

Maximum mark for the entrance exam is 100.

Minimum mark, sufficient for considering the entrance exam results as successfully passed, is 56*.

The total mark is determined as the sum of marks for answers provided by a candidate for each of the questions including candidate's answers to additional questions.

An answer provided by a candidate to each of the questions (4 main questions and 1-2 additional questions) is evaluated by the Examination Board separately according to the descriptors below:

Mark Range	Descriptors
0-7	The answer has no valuable information, a candidate reveals absence of knowledge of the main concepts, is not able to relate theory to practice.
8-14	Partially relevant or not sufficiently comprehensive answer evidencing significant gaps in knowledge; formal answers by the book; evidence of not understanding the questions.
15-20	Sufficient knowledge revealed; sufficient comprehensive answer is provided. A candidate demonstrates ability to form his/her own judgement. There are insignificant gaps in knowledge presentation.
21-25	Comprehensive based on critical thinking answer generated by a candidate. The answer relates theory and practice and is supported by conclusions made by a candidate.

FOOTNOTE

** In case a candidate earns less than 56 marks for the entrance exams, a candidate is not allowed for enrollment competition as having not passed the entrance exams.*

CONTENT OF SECTIONS AND TOPICS OF THE ENTRANCE EXAM

Fundamentals of Geo-urbanism
Geography of the world's population
Ecology of cities
Environmental safety
Structure of the lithosphere
Modern tectonic processes in the lithosphere
Resource ecological function of the lithosphere
Geographical shell
The Relief of the Earth. Factors of relief formation
Processes in the atmosphere
Surface waters
General biology. Diversity of life on Earth
Chemical organization of living systems
Fundamentals of soil science
Soil formation process
Soil organic matter
Soil fertility
Water and air properties of the soil
Basic concepts in geoinformation systems
Data in geoinformation systems, their organization
Ecology of organisms
Ecology of populations
Ecosystem and biogeocenosis
Ecosystem dynamics
The biosphere as a global ecosystem
The concept of environmental pollution. Classification and forms of pollution (pollutants)
Environmental impact of industrial enterprises
Protection of atmospheric air
Protection of water resources
Basic concepts of environmental monitoring
Monitoring of the natural components
Fundamentals of environmental regulation
Reduction of emissions and discharges of pollutants into the environment
Nature management as a system of human activity affecting nature
Types of resources. Natural resource potential. Resource availability
Rational use of natural resources
Economics of environmental management
The concept of risk. The concept, types and essence of environmental risk
Classification of hazards and risks
Methodology of risk analysis and assessment
Natural risk. Dangerous natural phenomena
Technogenic risk. Problems of technogenic safety
The doctrine of the biosphere
Living matter, chemical composition
The doctrine of the noosphere. Technogenesis
Basic concepts of landscape studies
Properties of natural landscapes
Natural and anthropogenic landscapes
The impact of mining and processing production on the environment
The impact of mining and processing production on the air basin

The impact of mining and processing production on the water basin
The impact of mining and processing production on natural landscapes and subsoil
Recultivation of lands disturbed by mining operations
Complex use of mineral raw materials. Methods of enrichment and processing of raw materials
Geochemistry of geospheres
Geochemistry of the noosphere
Geochemical classifications of elements
Methods of substance investigation (chemical, mineral composition)

RECOMMENDATIONS FOR ENTRANCE TEST PREPARATION

Main and additional readings:

K.C. Condie. Earth as an Evolving Planetary System. – New York: Academic Press. – 2021. – 397 p.

G. Filippelli. Climate Change and Life: The Complex Co-evolution of Climate and Life on Earth, and Beyond. – Amsterdam: Elsevier. – 2022. – 275 p.

J.D. Phillips. Landscape Evolution: Landforms, Ecosystems, and Soils. – Amsterdam: Elsevier. – 2021. – 342 p.

D.A. Vallero. Environmental Systems Science: Theory and Practical Applications. – Amsterdam: Elsevier. – 2021. – 692 p.

J. Wu, J. He, G. Christakos. Quantitative Analysis and Modeling of Earth and Environmental Data: Space-Time and Spacetime Data Considerations. – Amsterdam: Elsevier. – 2021. – 492 p.

Internet resources:

Scopus database <https://www.scopus.com>

Web of Science database <https://www.webofknowledge.com>