APPROUVED:
DEAN:
/Prof. Dsc. G. Raynovski/

Examination for admission in the
Doctoral programme 4.1. Physical Sciences, Physics of Ocean, Atmosphere and near-Earth Space

1. Physical and chemical properties of the sea water. Equation of state. Freezing and melting processes in the sea.
2. Acoustic and optical properties of seawater.
3. Water masses in the world ocean: formation, classification, T-S analysis.
4. Ocean currents. Methods of measurement. Classification, seasonal and synoptic variability. Thermohaline circulation.
5. Basics of ocean dynamics. Momentum equations. Geostrophic currents. Dynamical method of current calculation.
6. Ekman theory of ocean currents. Theories of Sverdrup, Stomell and Munk for wind-driven oceanic circulation.
7. Waves in the ocean. Classification and characteristics. Ocean tides.
8. Atmosphere composition and structure. Vertical and horizontal structure of the atmosphere. Surface layer. Troposphere. Stratosphere.
9. The static atmosphere. Basic equation and models. Geopotential and Geopotential maps.
10. Thermodynamics of dry and moist air. Adiabatic and non-adiabatic processes. Humidity characteristics and measurement.
11. Radiation processes in the atmosphere. Basic radiation laws. Short and long wave radiation, radiation balance
12. Clouds and fog. Formation processes. Macro and mircro-characteristics. Rain formation and classification.
13. Basics of atmosphere dynamics. Momentum equation in the atmosphere. Gradient and geostrophic wind. Boundary layer and Ekman spiral.
14. Wind formation. Local winds in mountain and coastal areas. Orographic winds.
15. General atmosphere circulation. Definition, principal factors and structure elements.
16. Earth as a planet in the Solar System. Origin, age, shape and dimensions.
17. Earth's magnetic field. Elements, short and long-term variations. Geomagnetic activity.
18. Near-Earth magnetic field. Magnetosphere. Solar wind.
19. Ionosphere. Formation - photoionization, impact ionization, recombination. Ionospheric layers, characteristics.
20. Interconnection between processes in the magnetosphere, ionosphere, solar wind, aurora and magnetic storms.

Literature sources:

1. Л. Кръстанов, С. Панчев и В. Андреев, Обща метеорология, Наука и изкуство, 1978
2. С. Панчев, Основи на атмосферната физика , Акад. издателство „проф. Марин Дринов”, 2003
3. Е. Станев, Физическа океанография, Университетско издателство, 1980
4. Г. Тенчов, Увод в геофизиката, Университетско издателство, 2003.
5. М. Сиракова, Атмосфера и климат, Херон прес, 2000.
6. D. Ahrens, Meteorology today, Brooks/Cole, 2009.
7. G. W. Prosll, Physics of the Earth's space environment, Springer, 2004.
8. R. Mcilveen, Fundamentals of Weather and Climate, Oxford, 2010
9. L. D. Talley, G. L. Pickard, W. J. Emery, J. H. Swift, Descriptive Physical Oceanography: An Introduction, Elsevier, 2011.
10. W. Lowrie, Fundamentals of Geophysics, Cambridge, 2007

Head of Department „Meteorology and Geophysics“:

13.07.2022 /Assoc. Prof. G. Gerova/