Final Exam – Immunology, Cell and Microbiology topics

- 1. Mechanisms of activation and inactivation of signal transduction pathways.
- 2. The correlation between diseases and signal transduction defects: description of 3 signaling related human diseases.
- 3. Flow cytometry, fluorescence activated cell sorting.
- 4. Principles of fluorescence and confocal microscopy and their applications
- 5. Intracellular and cell surface labeling techniques for microscopic analyses. Direct and indirect labeling methods.
- 6. Molecular targets for cancer therapy in the signal transduction pathways. Cancer immunotherapy.
- 7. Active and passive membrane transport processes. Genetic diseases associated with defective transmembrane transport. Multidrug resistance.
- 8. Human tumor viruses, molecular mechanisms of their oncogenesis. Viral escape mechanisms.
- 9. Pathogenesis of viral infections. Types of viral infections at cellular and host levels.
- 10. Laboratory methods for detection of viruses and viral infections.
- 11. Bacterial virulence factors and their mechanisms of action
- 12. Culture and identification of bacteria. Current techniques in diagnostics of bacterial infections, antibiotic sensitivity testing methods.
- 13. Active and passive immunization, *types of vaccines* currently used for active immunization.
- 14. The role of oncogenes and tumor-suppressor genes in carcinogenesis. Predisposing factors of cancers.

- 15. Escape mechanisms of tumors from host defense.
- 16. Inflammatory responses and inflammation-associated diseases.
- 17. Regulation of cell growth, division and death.
- 18. Production of monoclonal and polyclonal antibodies, and possibilities of their practical use.
- 19. Methods based on primary antigen antibody interactions (ELISA, immunohistochemistry / immunofluorescence, immunoprecipitation, immunoblot methods).
- 20. Methods based on secondary antigen antibody interactions (precipitation, immunodiffusion assays, agglutination) and testing the complement system.
- 21. Isolation/separation of immune cells and their characterization based on cell surface markers.
- 22. Investigation of the function of macrophages and other phagocytes.
- 23. Polyclonal activation of lymphocytes and examination of their functions.
- 24. Identification of cytokine-producing cells (ELISPOT, "multicolor" intracellular cytokine staining).
- 25. Immunological high throughput screening methods for cytokine analysis. Investigation of antigenspecificity of T cell responses.