

<i>Course Name</i> <b>Infection, Immunity and Genetics–Links to Modern Psychology</b>	
<i>Lecturer:</i> Assoc. Prof. Lubomira Nikolaeva-Glomb, MD, PhD	
<i>Type of Course:</i> Elective course	<i>Educational degree</i> Master's
<i>Year</i> Second	<i>Semester</i> 3 <sup>rd</sup>
<i>ECTS</i> 3	<i>Workload</i> 30 hours of lectures
<i>Type of education</i> Fulltime education	
<i>Assessment</i> Written final paper	<i>Language of Education</i> English

### **Prerequisites**

No

### **Course Aims**

The course is designed in three relatively distinct but tightly interrelated parts, i.e. infection, immunity and genetics, and their respective roles in human behavior, social life and pathology. The course presents the tentative scientific answers to questions about the forces that shape who we are, how we live, how we act and to what extent we are shaped by our genes or by our environment, i.e. how important are genetic or infectious factors and do they influence the mental state, personality, intelligence, sexual orientation, criminality, and addictions? Contemporary science constantly faces a series of ethical and psychological challenges and one should be trained to always hold in mind the existing solid links connecting individual mentality, ethics and morality to modern biomedical research. The course aims at introducing the basic terminology and principles of microbiology and infection, immunology, genetics, genomics and proteomics. Students will be trained to search, to find, to identify, to understand, to solve challenging issues arising from the extremely rapid technological development which in some specific areas like research in molecular biology, far exceeds the rate of individual development.

### **Lectures**

#### **1. INFECTION. INFECTIOUS AGENTS. MICRO- AND MACROORGANISM. STUDYING DISEASES.**

Basic terms and definitions. Infectious agent, infection, infectious disease. Bacteria, fungi, viruses, prions. Main research methods. *In vitro* and *in vivo* studies. Apoptosis. Transgenic animals. Animal models of human diseases. The blood-brain barrier and its role for the safety of the nervous system.

Pathogenic bacteria. Bacterial infections of the central nervous system. Bacterial neurotoxins. Viral infections of the central nervous system. Infectious causes for temporary and/or permanent brain damage. How infections might be responsible for mental illnesses? Do pathogenic bacteria and viruses influence human and social behavior?

#### **2. PRIONS**

The prion protein, properties of PrP<sup>C</sup> and PrP<sup>Sc</sup>. Conversion of PrP<sup>C</sup> to PrP<sup>Sc</sup>. Prion diseases. Transmissible spongiform encephalopathies: Kuru, Creutzfeldt-Jakob disease (CJD) and the variant of Creutzfeldt-Jakob disease (vCJD), Gerstmann-Sträussler-Scheinker syndrome and fatal familial insomnia, mad cow disease, scrapie.

### 3. IMMUNOLOGY. THE IMMUNE SYSTEM

Basic terms and definitions. Innate immunity. Acquired immunity. Primary and secondary immune response. Lines of immune defense. Major components of the immune system. Principles of adaptive immunity. Immunological memory. Immunizations.

### 4. IMMUNOPATHOLOGY. PSYCHONEUROIMMUNOLOGY

Dysfunctional immunity. Hypersensitivity and autoimmunity. Autoimmunity and mental diseases – is there a link? Stress and infection. Stress and immunity. Stress and psychosomatic disorders.

### 5. GENETICS AND EVOLUTION

Basic terms and definitions. Mendelian genetics. Heredity, variability, role of the environment. Are mental diseases inherited? Genetics, genomics, proteomics, glycomics. Omics. Chromosomes, genetic code, gene expression. Mitochondrial DNA. Human genome project. Ethical components.

Genetics, evolution and experience. Individual and social experience. What is inherited and what is learned? The interaction of genetic factors and experience.

### 6. PERSONALITY AND GENETICS

Personality genetics. Molecular genetics and human personality. Genetics of human psychological differences.

### 7. BEHAVIORAL GENETICS

Traditional research strategies: studies of twins and adoptees. Search for pieces of DNA associated with particular behaviors, e.g. potential locations for genes associated with major mental illnesses such as schizophrenia and bipolar disorder. “Nature-nurture” debate. Evolution of behaviors.

### 8. HAPPINESS AND DEPRESSION

Is happiness inherited? Is it infectious? Are there people who are immune to depression? Medical models of depression.

### 9. SOME MAJOR ISSUES OF BIOETHICS

Controversial ethics brought about by advances in biotechnology, molecular biology and medicine. Assisted reproductive technologies. Surrogate motherhood. Abortion. Cloning. Euthanasia. Informed Consent. Organ donation. Organ cloning. Hybrid embryos. Stem cells research.

### REFERENCES

- Kalat, J. W. (2009): *Biological psychology* (10th ed.). Belmont, CA: Wadsworth Cengage Learning.
- Pinel, J. P. J. (2000): *Biopsychology* (10th ed.). Needham Heights, MA: Allyn & Bacon.
- Jang, K. L. (2005): *The Behavioral Genetics of Psychopathology: A Clinical Guide*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Dunbar, R., Barrett, L. & Lycett, J. (2007): *Evolutionary Psychology—A Beginner’s Guide: Human Behaviour, Evolution and the Mind*. Oxford: Oxford.
- Abbas, K., Lichtman, A. H. (2011): *Basic Immunology: Functions and Disorders of the Immune System*. Philadelphia, PA: Saunders Elsevier.
- Levinson, W. (2010): *Review of Medical Microbiology & Immunology* (11th ed.). McGraw Hill Companies, Inc.

[http://www.ornl.gov/sci/techresources/Human\\_Genome/elsi/behavior.shtml](http://www.ornl.gov/sci/techresources/Human_Genome/elsi/behavior.shtml)

<http://www.personalityresearch.org/bg.html>

<http://www.bioethics.net/>

### METHODS OF ASSESSMENT:

Written final paper