*COURSE: Bioinformatics of Biomarkers and Individualize Medicine, Spring 2012*

Course time line: 14 Weeks - less two sessions for exams =13 weeks x 2 lectures/wk less 2 sessions for project presentation = 24 lectures as 2 groups of 12

**Unit 1 Biomarker discovery and validation** (director Alexei Fedorov)
Reserve materials: None

Lecture 1 Definition and Clinical Need for biomarkers (Drs. Debra Gmerek and Keith Crist)
Lecture 2 Introduction to genomics and RNomics (Dr. Alexei Fedorov)
Lecutre 3 Single Nucleotide Polymorphism p1 (Dr. John Gray)
Lecutre 4 Single Nucleotide Polymorphism p2 (Dr. John Gray)
Lecture 5 Epigenomics (Drs. Ivana de la Serna and Ashwin Prakash)
Lecture 6 Transcriptomic p1 (Dr. Alexei Fedorov)
Lecture 7 Transcriptomic biomarkers p2 (Dr. Alexei Fedorov)
Lecture 8 Proteomic biomarkers (Dr. Nikolay Modyanov)
Lecture 9 Metabolomics biomarkers (Drs. Dragan Isailowic and Larisa Fedorova)
Lecture 10 a) Challenges in Population Genetics (Dr. Alexei Fedorov)
b) Genome Wide Association Studies - requirements for validity (Dr. Manohar Ratnam)
Lecture 11 Systems Biology (Tools, Statistics, Modeling) (Dr. Alexei Fedorov)
Lecture 12 Projects (30 years of Evolution of bacteria, Richard Lensky papers)
Exam

**Unit 2. Individualized Medicine** (Director: Dr. Beata Lecka-Czernik)

Lecture 13 Clinical Need - where has it been important (D. Gmerek, PhD – Associate Dean for Research and K. Crist, PhD - Dept. Surgery)
Lecture 14 Pharmacogenomics and personalized ADMET (W. Messer, PhD – Dept. Pharmacology)
Lecture 15 Biomarkers for individualized therapy for breast and prostate cancer (M. Ratnam, PhD - Dept. Biochemistry and Cancer Biology)
Lecture 16 Biomarkers of cancer cell motility (K. Eisenmann, PhD – Dept. Biochemistry and Cancer Biology)
Lecture 17 Endothelial biomarkers of cardiovascular disease and stem cell therapy (N. Abraham, PhD – Dept. Physiology and Phamacology)
Lecture 18 Biomarkers of bone formation and stem cell therapy (B. Lecka-Czernik, PhD – Dept. Orthopaedic Surgery)
Lecture 19 Biomarkers for stroke (G. Tietjen, MD – Dept. Neurology)
Lecture 20 Biomarkers for Alzheimer disease (K. Hensley, PhD – Dept. Pathology)
Lecture 21 Individualized immunotherapy (R. Worth, PhD – Dept. Microbiology and Immunology)
Lecture 22 Targeted transplant, donor-recipient matching (S. Stepkowski, PhD – Dept. Microbiology and Immunology)

Lecture 23 Validation - Design and conduct of trials - Patient selection (J. Willey, MD – Dept. Medicine)
Lecture 24 Statistical methods for Biomarkers - (S. Khuder, PhD – Dept. Medicine)

Exam