**1. Title of Course :** Molecular Mechanisms of Disease (CBNP5068Q)

**2. Days/Hours :** 2015 Spring, 6:00 – 9:00 PM, Mondays, Feb. 2 – May 18

**3. Course Directors/emails/telephone/TA :** Yongkyu Park, Ph.D., E-mail: parky1@njms.rutgers.edu

Telephone: 973-972-2969, Fax: 973-972-7489, Office: Room G-665, MSB

**4. Summary of course/materials needed/exams/presentations/etc. :**

For 2015 Masters and Ph.D. students

The classroom is at G-609B, MSB.

**Objectives:** The course "Molecular Mechanisms of Disease" covers the following areas: 1) Cancer 2) Aging associated changes and 3) Cardiovascular diseases etc. In this course we will introduces the use of baker's yeast, flies, zebrafish, and mouse as model systems to understand the diseases development at a molecular and cellular level. The course starts with an overview about the various model systems and is followed by several mechanistic topics including angiogenesis, autophagy, apoptosis, cellular calcium metabolism, chromatin modifications, and DNA-specific processes (chromosomal and mitochondrial DNA) in cancer, aging, cardiovascular and mitochondrial diseases.

**Prerequisites:** Background in Cell and Molecular Biology

**Course content:** Introduction into yeast as a disease model system, Fly genetics and screens for disease study, Zebrafish: a model for human disease, Autophagy and cancer: from yeast to humans, Angiogenesis and cancer, Convergent and divergent mechanisms in cancer and aging, Vascular stiffness during aging, Mitochondrial DNA in aging and diseases, Studies of cancer, aging, and heart disease in fly, Transgenic mouse models and heart diseases, Stem cell usages for the rescue of disease, Calcium handling in the heart disease, Mechanisms of heart failure: involvement of apoptosis, Histones and histone deacetylases in the heart disease

**Textbook:** There is no required textbook. Slide (a pdf file) will be provided a week ahead.

**5. Syllabus/class schedule/lecturers :**

2015 Spring, 6:00 – 9:00 PM, Mondays, Feb. 2 – May 18, G-609, MSB

Lecturers: Department of Cell Biology and Molecular Medicine (Drs. Andreas Ivessa, Yongkyu Park, Joseph Leibovich, Diego Fraidenraich, Lin Yan, Gopal Babu, Mariana De Lorenzo, Miho Matsuda, Dominic DelRe, Shinichi Oka, Lai-Hua Xie, Danish Sayed) and Dr Katsunori Sugimoto <sugimoka@njms.rutgers.edu>

(<http://njms.umdnj.edu/departments/cell_biology_and_molecular_medicine/index.cfm>)

**Class Schedule**

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| Date | Title | Lecturer |
| Feb. 2 | Fly genetics and screens for human disease study | Yongkyu Park |
| Feb. 9 | Yeast as a model system to study aging mechanisms | Andreas Ivessa |
| Feb. 16 | President’s Day |  |
| Feb. 23 | Zebrafish: a model for human disease | Miho Matsuda |
| Mar. 2 | Angiogenesis and cancer | Joseph Leibovich |
| Mar. 9 | Convergent and Divergent mechanisms in cancer and aging | Mariana De Lorenzo |
| Mar. 16 | Autophagy and cancer: from yeast to humans | Lin Yan |
| Mar. 23 | Middle Exam |  |
| Mar. 30 | DNA damage repair; good or bad for cancer development and treatment | Katsunori Sugimoto |
| Apr. 6 | Mechanisms of heart failure: involvement of apoptosis | Dominic DelRe |
| Apr. 13 | Rescue of heart disease by stem cells | Diego Fraidenraich |
| Apr. 20 | Abnormal calcium handling in heart disease | Gopal Babu |
| Apr. 27 | Molecular mechanisms of metabolic disorders | Shinichi Oka |
| May 4 | Transcriptional and Epigenetic changes during heart disease | Danish Sayed |
| May 11 | Ion channels and channelopathies | Lai-Hua Xie |
| May 18 | Final Exam |  |