CBIO 453. Cell Biology I. 3 Units.
Part of the first semester curriculum for first year graduate students along with CBIO 455. This course is designed to give students an intensive introduction to prokaryotic and eukaryotic cell structure and function. Topics include membrane structure and function, mechanisms of protein localization in cells, secretion and endocytosis, the cytoskeleton, cell adhesion, cell signaling and the regulation of cell growth. Important methods in cell biology are also presented. This course is suitable for graduate students entering most areas of basic biomedical research. Undergraduate courses in biochemistry, cell and molecular biology are excellent preparation for this course. Recommended preparation: Undergraduate biochemistry or molecular biology.

CBIO 455. Molecular Biology I. 3 Units.
Part of the first semester curriculum for first year graduate students along with CBIO 453. This course is designed to give students an intensive introduction to prokaryotic and eukaryotic molecular biology. Topics include protein structure and function, DNA and chromosome structure, DNA replication, RNA transcription and its regulation, RNA processing, and protein synthesis. Important methods in molecular biology are also presented. This course is suitable for graduate students entering most areas of basic biomedical research. Undergraduate courses in biochemistry, cell and molecular biology are excellent preparation for this course. Recommended preparation: Undergraduate biochemistry or molecular biology.

CBIO 456A. Since You Were Born: Nobel Prize Biomedical Research in the Last 21 Years- Section A. 1 Unit.
This course is one of four sections that will cover major advances in biomedical research by review of Nobel Prize-winning topics from the past 21 years. Each section will cover 8 Nobel prize topics (1 topic/2 hour session/week for 8 weeks). Students will read critical research papers of the Nobel prize scientist(s) in preparation for guided in-class discussion led by the faculty mentor. The CBIO456A section will cover Nobel Prizes related to the areas of Genetics & Genome Science, Systems Biology & Bioinformatics, and RNA Biology. These include: 1) 2012 Prize, J. Gurdon and S. Yamanaka: Mechanisms of pluripotent stem cell development and reprogramming; 2) 2010 Prize, R. Edwards: Development of in vitro fertilization; 3) 2009 Prize, E. Blackburn, C. Greider, and J Szostack: Mechanisms of chromosome protection by telomeres and telomerase; 4) 2009 Prize, Y. Ramakrishnan, T. Steitz, and A. Yonath: Structure/function analysis of ribosomes; 5) 2007 Prize, M. Capecchi, M. Evans, and O. Smithies: Discovery/development of transgenic and gene-deletion methods in mice; 6) 2006 Prize, A. Fire and C. Mello: Discovery/development of RNA interference-gene silencing methods; 7) 2006 Prize, R. Kornberg: Mechanisms of eukaryotic transcription; 8) 1995 Prize, E. Lewis, C. Nusslein-Volhard, and W. Wieschaus: Mechanisms of genetic control in early embryonic development.

CBIO 456B. Since You Were Born: Nobel Prize Biomedical Research in the Last 21 Years- Section B. 1 Unit.
This course is one of four sections that will cover major advances in biomedical research by review of Nobel Prize-winning topics from the past 21 years. Each section will cover 8 Nobel prize topics (1 topic/2 hour session/week for 8 weeks). Students will read critical research papers of the Nobel prize scientist(s) in preparation for guided in-class discussion led by the faculty mentor. The CBIO456B section will cover Nobel Prizes related to the areas of Molecular Biology & Microbiology, Molecular Virology, Pathology-Immunology, and Cell Biology. These include: 1) 2016 Prize, Y. Ohsumi: Mechanisms of Autophagy; 2) 2015 Prize, W. Campbell, S. Omura, and Y. Tu: Therapies against roundworms & malaria; 3) 2011 Prize, B. Beutler, J. Hoffman, and R. Steinman: Mechanisms underlying innate immunity and adaptive immunity; 4) 2008 Prize, H. zur Hausen, F. Barre-Sinoussi, and L. Montagnier: Discovery of human immunodeficiency virus and oncogenic papilloma viruses; 5) 2008 Prize, O. Shimomura, M. Chalfie, and R. Tsien: Discovery/development of green fluorescent protein for biological applications; 6) 2005 Prize, B. Marshall and J. Warren: Discovery of Helicobacter pyloris as pathogenic mechanism in peptic ulcers/gastritis; 7) 1999 Prize, G. Blobel: Mechanisms of protein sorting and subcellular trafficking; 8) 1996 Prize, P. Doherty and R. Zinkernagel: Mechanisms of cell-mediated immune defense.

CBIO 456C. Since You Were Born: Nobel Prize Biomedical Research in the Last 21 Years- Section C. 1 Unit.
This course is one of four sections that will cover major advances in biomedical research by review of Nobel Prize-winning topics from the past 21 years. Each section will cover 8 Nobel prize topics (1 topic/2 hour session/week for 8 weeks). Students will read critical research papers of the Nobel prize scientist(s) in preparation for guided in-class discussion led by the faculty mentor. The CBIO456B section will cover Nobel Prizes related to the areas of Biochemistry, Nutrition, Pharmacology, and Pathology-Cancer. These include: 1) 2015 Prize, T. Lindahl, P. Modrich, and A. Sancar: Mechanisms of DNA Repair; 2) 2014 Prize, E. Betzig, S. Hell, W. Moerner: Development of super-resolution fluorescence microscopy; 3) 2012 Prize, R. Lefkowitz and B. Kobilka: Structure/function analysis of G protein-coupled receptors; 4) 2004 Prize, A. Ciechanover, A. Hershko, and I. Rose: Mechanisms of ubiquitin-mediated protein degradation; 5) 2003 Prize, P. Lauterbur and P. Mansfield: Development of magnetic resonance imaging (MRI) methods; 6) 2002 Prize, S. Brenner, H.R. Horvitz, and J. Sulston: Mechanisms for genetic regulation of organ development and programmed cell death; 7) 2002 Prize, J. Fenn, K. Tanaka, and K. Wuthrich: Development of mass spec and NMR methods for biological macromolecules; 8) 2001 Prize, L. Hartwell, T. Hunt, and P. Nurse: Mechanisms of cell cycle regulation.
CBIO 456D. Since You Were Born: Nobel Prize Biomedical Research in the Last 21 Years - Section D. 1 Unit.

This course is one of four sections that will cover major advances in biomedical research by review of Nobel Prize-winning topics from the past 21 years. Each section will cover 8 Nobel prize topics (1 topic/2 hour session/week for 8 weeks). Students will read critical research papers of the Nobel prize scientist(s) in preparation for guided in-class discussion led by the faculty mentor. The CBIO456D section will cover Nobel Prizes related to the areas of Neuroscience, Physiology & Biophysics, and Pathology-Molecular Basis of Disease. These include: 1) 2014 Prize, J. O'Keefe, M-B. Moser, and E. Moser: Mechanisms of nerve cell spatial positioning in the brain; 2) 2013 Prize, J. Rothman, R. Scheckman, and T. Sudhof: Mechanisms of intracellular vesicle trafficking and biomolecule secretion; 3) 2004 Prize, R. Axel and L. Buck: Structure/function of odorant receptors and organization of olfactory system; 4) 2003 Prize: P. Agre and R. MacKinnon: Structure/function analysis of channel proteins in cell membranes; 5) 2000 Prize, A. Carlsson, P. Greengard, and E. Kandel: Mechanisms of signal transduction in the nervous system; 6) 1998 Prize, R. Furchgott, L. Ignarro, and F. Murad: Discovery/mechanisms of nitric oxide as signaling molecule in cardiovascular system; 7) 1997 Prize, S. Prusiner: Discovery/prions as new biological principle of infection in neurological disease; 8) 1997 Prize, P. Boyer, J Walker, and J. Skou: Mechanisms of mitochondrial ATP synthesis and Na, KATPase pump function.