课程名（Coursename）
Protein Folding, Misfolding and Disease

课程代码（Coursenumber）
M1

课程对象（Audience）
Graduates

开课教师（Teacher）
Prof. A. Fersht, Dr S. E. Jackson, and Prof. C. M. Dobson

学期（Semester）

课程描述（Description））
Proteins are simple, linear-chain biopolymers synthesised from amino acids. However, the polypeptide chains that are formed fold to form the most diverse array of three-dimensional structures giving proteins an incredible range of functions and activities. The protein folding problem, that is how a flexible polypeptide chain folds into a compact and unique structure (sometimes on the timescale of just a few microseconds), remains one of the biggest unsolved questions in Biology. This course looks at different aspects of this important problem.
The course will begin with a brief overview of the material to be covered including a short revision on Part IB and II lecture courses on protein structure and stability. Although desirable, it is not essential to have done the Part II course.
Experimental techniques for studying folding including fluorescence and circular dichroism, and the use of H/D amide exchange in conjunction with high resolution multi-dimensional NMR spectroscopy and mass spectrometry are covered. The kinetics of both unfolding and folding processes will be described with respect to proteins which fold through populated intermediate states and those that fold in a two-state manner. Kinetic chevron plots and the determination of folding pathways using protein engineering techniques and \_-value analysis will be discussed. In addition to the experimental work in the field, an account of current computational approaches to studying folding reactions will be given.
The lecture course will end with six talks on recent developments in the protein folding field. Two lectures will focus on the link between protein folding and disease, in particular, how proteins misfold, aggregate and in some cases form fibril-type structures known as amyloid. These amyloids are associated with many diseases including Alzheimers, Parkinsons and Creutzfeldt-Jakob disease. This will be followed by two lectures on protein folding in the cell, a rather harsh environment in which proteins have to fold. The role of a large number of helper proteins, collectively known as molecular chaperones, will be described including their structures and mechanisms. Single-molecule techniques are gaining importance in many areas of chemistry and biology, and recent work using single-molecule techniques to study protein folding will be described. The course will end with a lecture on the folding of complex, multi-domain proteins.

课时信息（Totalhours）

教参信息（Textbookinfo）
1 Protein Folding, Misfolding, and Disease (Methods in Molecular Biology) by Andrew F. Hill, Roberto Cappai, Kevin Barnham, and Stephen P. Bottomley (Hardcover - Jan. 2011)
ISBN-13: 978-1603272216
世界各地拥有馆藏的图书馆（OCLC）:1
2 Neurodegenerative Diseases and Metal Ions: Metal Ions in Life Sciences by Astrid Sigel, Helmut Sigel, and Roland K. O. Sigel (Hardcover - May 19, 2006)
ISBN-13: 978-0470014882
世界各地拥有馆藏的图书馆（OCLC）:139
3 Protein Misfolding in Neurodegenerative Diseases: Mechanisms and Therapeutic Strategies (Enzyme Inhibitors Series) by Robert D. E. Sewell (Hardcover - Dec. 3, 2007)
ISBN-13: 978-0849373107
世界各地拥有馆藏的图书馆（OCLC）:73
4 Protein Misfolding Diseases: Current and Emerging Principles and Therapies (Wiley Series in Protein and Peptide Science) by Marina Ramirez-Alvarado, Jeffery W. Kelly, and Christopher M. Dobson (Hardcover - June 28, 2010)
ISBN-13: 978-0471799283
世界各地拥有馆藏的图书馆（OCLC）:20
5 Proteins: Structure and Function by David Whitford (Paperback - May 20, 2005)
ISBN-13: 978-0471498940
世界各地拥有馆藏的图书馆（OCLC）:629
6 Oxidative Stress and Neurodegenerative Disorders by G. Ali Qureshi and S. Hasan Parvez (Hardcover - June 7, 2007)
ISBN-13: 978-0444528094
世界各地拥有馆藏的图书馆（OCLC）:60
7 Nanotechnology for the Regeneration of Hard and Soft Tissues by Thomas J. Webster (Hardcover - Sept. 3, 2007)
ISBN-13: 978-9812706157
世界各地拥有馆藏的图书馆（OCLC）:88
8 Supramolecular Structure and Function 9 (No. 9) by Greta Pifat-Mrzljak (Hardcover - Nov. 9, 2007)
ISBN-13: 978-1402064654
世界各地拥有馆藏的图书馆（OCLC）:55