

Syllabus of HKU Summer Programme in Chemical Biology

0. Introduction
1. Chemical biology of nucleic acids
 - 1.1. Introduction: DNA and RNA
 - 1.2. Natural modification of nucleic acids
 - 1.3. DNA methylation & the epigenetics
 - 1.4. Chemical synthesis of DNA and RNA
 - 1.5. Drug discovery around nucleic acids
 - 1.6. Gene therapy
 - 1.7. Advanced topics in chemical biology of nucleic acids
2. Amino acids, peptides and proteins
 - 2.1. Amino acids
 - 2.2. Peptides
 - 2.3. Proteins (synthetic protein chemistry)
 - 2.4. Peptidomimetics
3. Chemical biology of proteins
 - 3.0. Introduction
 - 3.1. Proteomics
 - 3.2. Protein labeling & chemical modifications
 - 3.3. Mechanism-based protein labeling
 - 3.4. Protein luminescence and fluorescence
4. Protein posttranslational modifications
 - 4.1. Introduction
 - 4.2. General categories of PTMs
 - 4.3. Chemical biology approach to study PTMs
5. Carbohydrates
 - 5.1. Fundamentals of carbohydrates
 - 5.2. Common carbohydrates
 - 5.3. The importance of sugars in biology
 - 5.4. Carbohydrate-based drugs
 - 5.5. Chemical synthesis
6. Chemical glycobiology
 - 6.1. Diversity of carbohydrates and its diverse roles in biology
 - 6.2. Glycobiology
 - 6.3. Chemical glycobiology (glycomimetics, carbohydrate-based vaccines, unnatural metabolic substrates)
7. Chemical biology of metals
8. Bio-orthogonal chemistry
9. Chemical biology approaches for tagging biomolecules
10. Chemical proteomics
11. Chemical genetics
12. Chemical biology tools for drug discovery