

國立臺灣大學生化科學研究所

110 學年度第 2 學期

「醣化學」

The ability to make structurally-defined glycans is essential for modern glycobiology. Such compounds are invaluable probes of glycan-mediated biology and they can also be used to generate vaccine candidates and serve as lead compounds for drug development. This course will provide students with an understanding of modern synthetic carbohydrate chemistry and give them a knowledge base that will allow further investigation either through independent study or in the laboratory. The focus will be primarily on synthetic carbohydrate chemistry, however, carbohydrate active enzymes (CAZymes) and their use in glycoside bond synthesis will also be covered. In addition, methods to characterize glycans using NMR spectroscopy and probe the binding of glycans by glycan-binding proteins will be discussed.

製作結構明確的聚醣能力對於現代醣生物學來說是非常重要的。這類化合物是探測及探討與醣相關的生物學的寶貴分子，它們也可以被開發成疫苗，並作為藥物開發的先驅化合物。本課程將為學生提供現代合成醣在化學上的知識基礎，使學生能夠在往後的研究中實行或激起對醣更深入的探討。課程重點將放在醣合成的化學上，且包括碳水化合物活性酶 (CAZymes) 和它們在醣苷鍵合成中的應用。此外，還將討論使用核磁共振光譜來描述醣的特徵，以及探測醣結合蛋白對醣結合的方法。下一頁將提供更詳細的課程安排。

課 號：BChem5052

課程識別碼：B46 U1120

授課教師：呂桐睿

上課時間：每星期二 09:10 AM -12:10 NOON

上課地點：生化館 N101 教室

週次	日期	授課內容
1	2/15	關鍵的有機和物理化學概念；碳水化合物結構和構型 Key Organic and Physical Chemistry Concepts; Carbohydrate Structure and Conformation
2	2/22	碳水化合物的結構和構型；降解反應；保護基 Carbohydrate Structure and Conformation; Degradative Reactions; Protecting Groups
3	3/01	保護基 Protecting Groups
4	3/08	保護基 Protecting Groups
5	3/15	功能基的相互轉化 Functional Group Interconversions
6	3/22	功能基的相互轉化 Functional Group Interconversions

7	3/29	合成單醣的新方法 De Novo Synthesis of Monosaccharides
8	4/05	民族掃墓節放假
9	4/12	期中考試 Mid Term Exam
10	4/19	醣苷鍵的化學合成 Chemical Glycosidic Bond Formation
11	4/26	醣苷鍵的化學合成 Chemical Glycosidic Bond Formation
12	5/03	醣苷鍵的化學合成 Chemical Glycosidic Bond Formation
13	5/10	CAZymes 和醣苷鍵的酶催化合成 CAZymes and Enzymatic Synthesis of Glycosidic Bonds
14	5/17	碳水化合物的核磁共振和醣蛋白結合的生物物理學測量 NMR of Carbohydrates and Biophysical Measurements of Glycan-Protein Binding
15	5/24	碳水化合物的核磁共振和醣蛋白結合的生物物理學測量 NMR of Carbohydrates and Biophysical Measurements of Glycan-Protein Binding
16	5/31	期末考試 Final Exam

Requirements

Assignment	Points
Midterm	200
Synthesis Problem	100
Paper Presentation	100
Final Examination	200
Total	600

Important Dates

Midterm	April 12, 2022
Synthesis Problem Distributed	April 19, 2022
Synthesis Problem Due	May 24, 2022 (by email)
Paper Presentations	TBD (will consult with students)
Final Examination	May 31, 2022

Synthesis Problem

You will each be assigned an oligosaccharide that you will need to provide a synthetic route to using the material you have learned in the course, as well as what you can find in literature.

Paper Presentation

You will each be assigned paper from the current literature relevant to the course, which you will need to present to the class (in English). You will work in pairs for this assignment and

the talks will be given during the month of May or early June at a ‘mini-symposium’ given outside of class at time we agree is convenient. Guidelines for this presentation will be provided later in the semester.

Comments Regarding the Synthesis Problem

The Synthesis Problem is an assignment on which you ***MUST*** work independently. Collaboration between each other, or with other graduate students, postdoctoral fellows or faculty is not allowed. You are, however, welcome to talk with me about any ideas you have in solving the problem.

Problem Sets

With the exception of the Synthesis Problem listed above, problem sets will be distributed for practice but will not be graded.

Help in Chinese – 中文幫忙

Should you need assistance about the course material in Chinese, you may contact Dr. Anthony Chu (朱駿叡) by email at 9623010@gmail.com. Dr. Chu has extensive experience in carbohydrate chemistry and is an award-winning teacher.