

# Analytical Techniques for Structural Characterization of Glycosaminoglycans

August 24-27, 2015

## Schedule

### MONDAY, AUGUST 24, 2015

9:00 a.m. - 9:15 a.m.

Introduction and Welcome

9:15 a.m. – 10:00 a.m.

**Lecture** – “GAG Analysis Methods, Part 1”

(Dr. Christian Heiss)

10:00 a.m. - 10:30a.m.

**Laboratory**

**(Pre-Experiments 1-3) Start Enzyme Digestions. Page 3**

10:30 a.m. - 10:45 a.m. - **BREAK**

10:45 a.m. - 11:15 a.m.

**Lecture** – GAG Analysis Methods (continued).

11:15 a.m. - 12:30 p.m.

**Laboratory**

**Experiment 4 – Nitrous Acid Preparation and Digestion. Page 9**

12:30 p.m. - 1:30 p.m. - **LUNCH**

1:30 p.m. - 2:45 p.m.

**Laboratory**

**Experiment 4 (continued) – HPLC injection. SAX-HPLC introduction.  
Page 9**

2:45 p.m. - 3:00 p.m. **BREAK**

3:00 p.m. - 4:00 p.m.

**Demo** – “LC-MS of LMW Heparins”

(Dr. Zhirui Wang)

4:00 p.m. – 5:00 p.m.

**Laboratory**

**Experiment 4 (continued) – Sample Data Analysis. Page 9  
Experiment 6 Sulfate Analysis - Hydrolysis. Page 13**

**TUESDAY, AUGUST 25, 2015**

8:45 a.m. – 9:00 a.m. Questions and Discussion

9:00 a.m. - 10:00 a.m.

**Laboratory**

**(Pre-Experiments 1-3) Stop Enzyme Digestions.**

**Experiment 2: Prepare Sample and Inject on SAX-HPLC. Page 6**

**Experiment 5 – Deacetylation and Nitrous Acid: Hydrazinolysis. Page 11**

10:00 a.m. - 10:15 a.m. **BREAK**

10:15 a.m. - 12:30 p.m.

**Laboratory**

**Experiment 1: UV and DMB Assay. Page 4**

**Experiment 6 Sulfate Analysis – Plate Assay. Page 13**

12:30 p.m. - 1:30 p.m. – **LUNCH**

1:30 p.m. - 2:45 p.m.

**Lecture – “TBA”**

(Dr. Jon Amster)

2:45 p.m. – 3:00 p.m. **BREAK**

3:00 p.m. - 4:00 p.m.

**Lecture – “Heparan sulfate in vascular biology and related human diseases.”**

(Dr. Lianchun Wang)

4:00 p.m. - 5:00 p.m.

**Laboratory**

**Experiment 5 – Deacetylation and Nitrous Acid: Stop Reaction and Lyophilize. Page 11**

**Experiment 3: Label with AMAC. Page 8**

**WEDNESDAY, AUGUST 26, 2015**

8:45 a.m. – 9:00 a.m. Questions and Discussion

9:00 a.m. - 10:00 a.m.

**Laboratory**

**Experiment 5 – Deacetylation and Nitrous Acid: Nitrous Acid and Inject into HPLC. Page 11**

10:00 a.m. – 10:15 a.m. **BREAK**

10:15 a.m. - 11:30 a.m.

**Lecture** – “Use of surface plasmon resonance (SPR) to study protein-glycosaminoglycan interactions.” (Dr. Gerardo Gutierrez-Sanchez)

11:30 a.m. - 12:30 p.m.

**Demo** – “Surface Plasmon Resonance” (Dr. Gerardo Gutierrez-Sanchez)

12:30 p.m. - 1:30 p.m. – **LUNCH**

1:30 p.m. - 2:45 p.m.

**Demo** – “Characterization of GAGs by NMR”

(Dr. Christian Heiss)

2:45 p.m. – 3:00 p.m. **BREAK**

3:00 p.m. - 4:00 p.m.

**Demo** – “NMR (cont.)” (Dr. Christian Heiss)

**Laboratory** - Data Analysis

4:00 p.m. - 5:00 p.m.

**Laboratory**

**Experiment 3 (DEMO): Separation of AMAC Labeled GAGs by Capillary Electrophoresis. Page 8**

**THURSDAY, AUGUST 27, 2015**

8:45 a.m. – 9:00 a.m. Questions and Discussion

9:00 a.m. - 10:00 a.m.

**Laboratory**

**Experiment 7 – MW Determination of whole GAGs and GAG products by SEC-HPLC. Page 15**

10:00 a.m. – 10:15 a.m. **BREAK**

10:15 a.m. - 12:30 p.m.

**Experiment 7 – MW Determination of whole GAGs and GAG products by SEC-HPLC – Data interpretation. Page 15**

12:30 p.m. - 1:30 p.m. – **LUNCH**

1:30 p.m. – 3:00 p.m.

**Laboratory**

**Final Data Interpretation and Analysis. Summary of Experiments**

**Course summary, Course evaluation, Final Questions & Answers**