

## *Essentials of Glycobiology - A Survey*

Dec 30 2019 - Jan 3, 2020    NCBS Graduate Elective Workshop    Sessions 1-2, 10am-12noon and Session 3, 2-3pm

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Every living cell in nature displays a dense and complex array of cell surface and secreted glycan chains, as well as intracellular glycosylation. For historical and technical reasons these essential components of life were poorly incorporated into the 20<sup>th</sup> century revolution in biology—becoming the “dark matter of the biological universe”. With improved technologies and a flood of new information, the myriad roles of glycans in biology and pathology can now be fully integrated into our understanding of life. This course will provide a broad overview of the structure, evolution, biology, functions, pathology and practical applications regarding glycans in nature, using the text "[Essentials of Glycobiology](#)" 3rd edition, 2017 Cold Spring Harbor Laboratory Press. Full Text available [online](#) at NCBI, and a collection of slides presenting all figures can be found [here](#). The online [Glycobiology Glossary](#) [Symbol Nomenclature](#) and [Study Guide](#) may be useful.

*Students should have graduate level exposure to molecular and cellular biology. Sessions will consist of brief lectures and student presentations, with open discussion. Each Student will read 2 selected chapters in detail and be prepared to present a **10 min** overview of **ONLY** the key facts about chapter content, using online information and slides as needed. Grading based on attendance and participation.*

Date/ Session	Chapters	Presenter
Dec 30, Session 1	<a href="#">1. Historical Background and Overview</a> <a href="#">2. Monosaccharide Diversity</a> <a href="#">3. Oligosaccharides and Polysaccharides</a> <a href="#">4. Cellular Organization of Glycosylation</a> <a href="#">5. Glycosylation Precursors</a> <a href="#">20. Evolution of Glycan Diversity</a> <a href="#">7. Biological Functions of Glycans</a>	Ajit Varki
Dec 30, Session 2	<a href="#">6. Glycosyltransferases and Glycan-Processing Enzymes</a> <a href="#">9. N-Glycans</a> <a href="#">10. O-GalNAc Glycans</a> <a href="#">11. Glycosphingolipids</a>	Ansuman Biswas Ansuman Biswas Khushboo Agrawal Rashmi Godbole
Dec 30, Session 3	<a href="#">12. Glycosylphosphatidylinositol Anchors</a> <a href="#">13. Other Classes of Eukaryotic Glycans</a> <a href="#">14. Structures Common to Different Glycans</a> <a href="#">15. Sialic Acids and Other Nonulosonic Acids</a>	Sarayu Beri Maroof Hashmi Divij Kinger Shahid Hussain

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Dec 31, Session 1	<a href="#">17. Proteoglycans and Sulfated Glycosaminoglycans</a> <a href="#">38. Proteins That Bind Sulfated Glycosaminoglycans</a> <a href="#">16. Hyaluronan</a> <a href="#">18. Nucleocytoplasmic Glycosylation</a>	UtkarshAyyangar Arun GS Mohamed Poonam S
Dec 31, Session 2	<a href="#">19. The O-GlcNAc Modification</a> <a href="#">21. Eubacteria</a> <a href="#">22. Archaea</a> <a href="#">23. Fungi</a>	AdityaDeshpande Shreyan Ray GauravKansagara NileshAghera
Dec 31, Session 3	<a href="#">24. Viridiplantae and Algae</a> <a href="#">25. Nematoda</a> <a href="#">26. Arthropoda</a> <a href="#">27. Deuterostomes</a>	ShyamiliGoutham Steffi Raju Poonam S UtkarshAyyangar
Jan 1, Session 1	<a href="#">28. Discovery and Classification of Glycan-Binding Proteins</a> <a href="#">29. Principles of Glycan Recognition</a> <a href="#">30. Structural Biology of Glycan Recognition</a> <a href="#">31. R-Type Lectins</a>	AbhikDutta Arun GS Abel CherianVarkey DigvijayLalwani
Jan 1, Session 2	<a href="#">32. L-Type Lectins</a> <a href="#">33.P-Type Lectins</a> <a href="#">34. C-Type Lectins</a> <a href="#">35. I-Type Lectins</a>	Prachi Joshi DrisyaDileep KavyaShetty TriptiKharbanda
Jan 1, Session 3	<a href="#">36. Galectins</a> <a href="#">37. Microbial Lectins: Hemagglutinins, Adhesins, and Toxins</a> <a href="#">42. Bacterial and Viral Infections</a> <a href="#">43. Parasitic Infections</a>	ShahidHussain ShailyaVerma AdityaDeshpande KavyaShetty
Jan 2, Session 1	<a href="#">39. Glycans in Glycoprotein Quality Control</a> <a href="#">41. Glycans in Systemic Physiology</a> <a href="#">40. Free Glycans as Signaling Molecules</a> <a href="#">8. A Genomic View of Glycobiology</a>	RashmiGodbole DrisyaDileep Shreyan Ray BharathSaravanan
Jan 2, Session2	<a href="#">44. Genetic Disorders of Glycan Degradation</a> <a href="#">45. Genetic Disorders of Glycosylation</a> <a href="#">46. Glycans in Acquired Human Diseases</a> <a href="#">47. Glycosylation Changes in Cancer</a>	Steffi Raju Abel CherianVarkey TriptiKharbanda ShyamiliGoutham
Jan 2 Session 3	<a href="#">48. Glycan-Recognizing Probes as Tools</a> <a href="#">49. Glycosylation Mutants of Cultured Mammalian Cells</a>	Prachi Joshi GauravKansagara

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	<a href="#">50. Structural Analysis of Glycans</a> <a href="#">51. Glycomics and Glycoproteomics</a>	NileshAghera AbhikDutta
Jan 3, Session 1	<a href="#">52. Glycoinformatics</a> <a href="#">53. Chemical Synthesis of Glycans and Glycoconjugates</a> <a href="#">54. Chemoenzymatic Synthesis of Glycans and Glycoconjugates</a> <a href="#">55. Chemical Tools for Inhibiting Glycosylation</a>	ShailyaVerma DigvijayLalwani MaroofHashmi SarayuBeri
Jan 3, Session 2	<a href="#">56. Glycosylation Engineering</a> <a href="#">57. Glycans in Biotechnology and the Pharmaceutical Industry</a> <a href="#">58. Glycans in Nanotechnology</a> <a href="#">59. Glycans in Bioenergy and Materials Science</a>	DivijKinger Mohamed BharathSaravanan KhushbooAgrawal
Jan 3, Session 3	<a href="#">60. Future Directions in Glycosciences</a> Course Recap and Final discussion.	AjitVarki

Also See [UCSD GRTC Slide Resource on Following pages](#)

## [UCSD GRTC Slide Resource](#)

The figures available through the above links to the NCBI website are deliberately downsized in quality for on-screen presentation. For access to and permission to reproduce high-quality figures, contact [Cold Spring Harbor Laboratory Press](#).

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