

**CHEMICAL BIOLOGY
2016-2017**

Master Degree:	CHEMISTRY AND BIOTECHNOLOGY	760M
Course title:	CHEMICAL BIOLOGY	5115
Year/Semester:	2016-2017 / FIRST	ECTS Credits: 4.0

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CONTENTS

UNIT1.The Fundamentals of Chemical Biology. Origins of Amino Acids. Making/ Syntheses of Amino Acids.

UNIT 2.Chemical Basis and Structural Principles of Peptides and Proteins. Peptide Synthesis. Chemical Ligation Strategies. Special and Conjugate Peptide Synthesis. Design of Peptides and Proteins. Pseudo peptides and Peptidomimetics. Genetic Code Expansion. Combinatorial Synthesis of Peptides. Diversity-Oriented Synthesis (DOS). Peptides as Drugs.

UNIT 3. The Fundamentals of Carbohydrates. General Synthetic Methods. Chemical Glycosylation Reactions. Monosaccharides. Oligosaccharides. Complex Polysaccharides. Glycopeptides and Glycoproteins. Glycomimetics. Glycobiology. Carbohydrate-Carbohydrate Interactions. Lectins and Antibodies. Glycomedicine: Antitumoral and antimicrobial Glycoconjugates. Mucin-based Vaccines.

UNIT 4. The Control and the Regulation of Gene Expression. Directed Mutagenesis. Basics of Cell Signaling: General Mechanisms. Signal Recognition. Types of Membrane Receptors. Intracellular Signal Transduction. Cell Responses. Cell Functions Signaling-mediated: Some Examples. Bacterial Biosignaling. Hormone Response Element.

UNIT 5. Antimicrobial Agents. Chemical Structure, Action and Biological Activity Mechanisms. Methods of Detection.

UNIT 6. Inorganic Elements in Biological Systems. Basic Concepts. Bioavailability. Biological Ligands. Metal-biomolecule Complexes. Biochemistry of d-block Metal Elements (Fe, Cu, Mn, Mo, Co, Zn) in Living Being. Biomedical and Pharmacological Applications of Inorganic Species.

REFERENCES

Title

Basic Bibliography

1. Introduction to Bioorganic Chemistry and Chemical Biology. David Van Vranken and Gregory Weiss. Garland Science, Taylor & Francis Group, LLC. 2013. ISBN 978-0-8153-4214-4.
2. Essentials of Chemical Biology: Structure and Dynamics of Biological Macromolecules. Andrew Miller and Julian Tanner. John Wiley & Sons. 2008. ISBN 978-0-470-84530-1.
3. Peptides: Chemistry and Biology: Second, Revised and Updated Edition. Norbert Sewald and Hans-Dieter Jakubke. Wiley-VCH. 2009. ISBN 978-3-527-31867-4.
4. Amino Acids, Peptides and Proteins in Organic Chemistry. Volumes 1-5. Andrew B. Hughes (Ed.). Wiley-VCH. 2009. ISBN 978-3-527-32096-7.
5. Glycoscience: Chemistry and Chemical Biology. 2nd Edition. Bertram O. Fraser-Reid; Kuniaki Tatsuta; Joachim Thiem (Eds.). Springer. 2008. ISBN: 978-3-540-30429-6.
6. Handbook of Chemical Glycosylation. Advances in Stereoselectivity and Therapeutic Relevance. Alexei V. Demchenko (Ed.). Wiley-VCH. 2008. ISBN 978-3-527-31780-6.
7. Lehninger Principles of Biochemistry. 6th Ed. David L. Nelson; Michael M. Cox. McMillan Learning. 2013. ISBN-10: 1-4292-3414-8; ISBN-13: 978-1-4292-3414-6.
8. Antibiotics: Actions, Origins, Resistance. Christopher Walsh. Publisher: ASM Press; 1st Edition. 2003.
9. Química Bioinorgánica. J. S. Casas, V. Moreno, A. Sánchez, J. L. Sánchez, J.H. Sordo. Editorial SINTESIS. 2010. ISBN 84-9756-027-2.
10. Bioinorganic Chemistry: Inorganic elements in the Chemistry of the Life. An introduction and guide. 2º Ed. W. Kaim and B. Schwederki. Wiley. ISBN 978-0-470-97523-7.

Additional Bibliography

11. Modern Synthetic Methods in Carbohydrate Chemistry: From Monosaccharides to Complex Glycoconjugates. Daniel B. Werz and Sébastien Vidal (Eds.). Wiley-VCH. 2014. ISBN: 978-3-527-33284-7.
12. The Sugar Code. Hans-Joachim Gabius (Ed.). Wiley-VCH. 2009. ISBN 978-3-527-32089-9.
13. Natural Products in Medicinal Chemistry. Stephen Hanessian (Ed.). Wiley-VCH. 2014. ISBN 978-3-527-33218-2.
14. Antibiotics: Targets, Mechanisms and Resistance. Claudio O. Gualerzi (Editor), Letizia Brandi (Editor), Attilio Fabbretti (Editor), Cynthia L. Pon (Editor). Publisher: Wiley-VCH; 1st edition. 2013.
15. Antimicrobial Peptides. David A. Phoenix (Author), Sarah R. Dennison (Author), Frederick Harris (Author). Publisher: Wiley-VCH; 1st edition. 2013.
16. Biochemistry of Signal Transduction and Regulation, Gerhard Krauss. Wiley-VCH; 5th Edition. 2014.
17. Signal Transduction. Lewis Cantley, Tony Hunter, Richard Sever, Jeremy Thorner. Cold Spring Harbor Laboratory Press; 1 edition. 2014.

Internet Resources

Cell Signalling Biology provides researchers, teachers and students alike with an outstanding online resource describing the biology of cell signalling. <http://www.biochemj.org/csb>

Nature Chemical Biology is an international monthly journal that provides a high-visibility forum for the publication of top-tier original research and commentary for the chemical biology community. <http://www.nature.com/nchembio/index.html>

Chemistry & Biology publishes reports of novel investigations in all areas at the interface of chemistry and biology. <http://www.journals.elsevier.com/chemistry-and-biology>

The International Chemical Biology Society (ICBS) is an independent, nonprofit organization dedicated to promoting research and educational opportunities at the interface of chemistry and biology. <http://www.chemical-biology.org>

ACS Chemical Biology provides an international forum for the rapid communication of research that broadly embraces the interface between chemistry and biology. <http://pubs.acs.org/journal/acbcct>

Members of the Division of Biological Chemistry use the principles of chemistry to assist in the development of a deeper understanding of biological processes. <http://www.divbiolchem.org/publications/acs-chemical-biology>



EVALUATION SYSTEM

	Retrievable	Non-retrievable
Writing exams	60%	
Classroom Observation Tasks		10%
Works and Projects		20%
Oral exams		10%
Total mark	100%	