

SEMESTER I
LSM2241 INTRODUCTORY BIOINFORMATICS

Prerequisite: LSM1102 or LSM1105 or LSM1106 or PR111A

Workload: 22 lecture hours, and 24 laboratory hours, with inquiry-based writing assignment, mid-semester CA, and final exam. A welcome video can be found [here](#).

Students will be introduced to the concepts, tools and techniques of bioinformatics, a field of immense importance for understanding molecular evolution, individualised medicine, and data-intensive biology. The module includes a conceptual framework for modern bioinformatics, an introduction to key bioinformatics topics such as databases and software, sequence analysis, pairwise alignment, multiple sequence alignment, sequence database searches, and profile-based methods, molecular phylogenetics, visualisation and basic homology modelling of molecular structure, pathway analysis and personal genomics. Concepts emphasised in the lectures are complemented by hands-on inquiry using bioinformatics tools in the practical sessions. Students will achieve highly valued skills as biological researchers with basic competence in computational and bioinformatics techniques, with an option to learn more advanced skills in upper level modules.

S/N	Topics	Lecture hours
1.	Introduction, Biological Databases and Bioinformatics Software Tool A survey of biological databases. Bioinformatics tools and techniques	2
2.	Biological Sequence Comparison, Alignments, Patterns, and Motifs: Theory, Tools and Algorithms Principles of sequence alignment. Fundamentals of sequence comparisons. Basics of BLAST database searches. Biological patterns and profiles.	8
3.	Molecular Phylogenetics Principles of molecular evolution. Techniques in phylogenetic inference	2
4.	Principles of Structural Biology, Biomolecular visualization and Structure Prediction Basics of structural biology and structural databases. Modelling bio-molecular structure from sequence.	4
5.	Latest Developments in Bioinformatics Networks and Pathways. Personal Genomics and the future of bioinformatics	4
Total Lectures: 12 x 2		22 h
Practicals / Tutorials: 12 x 2		24 h
Total:		46 h

Text (Reference books):

Practical Bioinformatics. Michael Agostino. 2012 Garland Science ISBN 9780815344568

Bioinformatics and Functional Genomics. Jonathan Pevsner. 2009. Wiley-Blackwell; ISBN: 0470085851

ASSESSMENT:

Component	Percentage
Inquiry-based assignment I (Individual)	15%
Inquiry-based assignment II (Group)	15%
Participation	10%
mid-semester CA test	20%
Final Exam	40%

MODULE COORDINATOR AND LECTURER:

Prof Greg Tucker-Kellogg

(Tel: 65164740, E-mail: dbsgtk@nus.edu.sg)