

# Bioinformatics

COMM015 (CSM17) Spring Semester 2009  
(dates now revised)  
Jonathan Y. Clark

20 hours of lectures/seminars (all in 03AZ01 Monday 15.00-17.00)

Lab practicals (all in 34BB04 Monday 17.00-18.00)

## Session 1. Introduction (19 Jan)

- overview

< Week 2. Break 26 Jan >

<Week 3. Break due to weather!>

## Session 2. Biological Classification (9 Feb)

- cluster analysis / phenetic systems
- PCLASS, DIANA shell

## Session 3. Biological Identification (16 Feb)

- computer-based keys and key generators
- DELTA system, DIANA shell

## Session 4. Evolutionary Systems (23 Feb)

- cladistic analysis
- PHYLIP

## Session 5. Inheritance

- a natural information system (2 Mar)

- DNA & RNA
- genetics and genomes
- transcription
- translation

## Session 6. Molecular Analysis (1) (9 Mar)

- protein structures
- alignment
- biological databases
- sequence data repositories

## Session 7. Molecular Analysis (2) (16 Mar)

- molecular evolution
- cladistic analysis
- PAUP

## Session 8. Simulations (1)

Soft Computing (23 Mar)

- genetic algorithms
- natural and artificial neural networks

## Session 9. Simulations (2)

Virtual Reality (30 Mar)

- Lindenmayer systems

## Session 10. Conclusions

& Summary (6 Apr)

- the future...
- where do we go from here?
- revision: questions and answers

## Suggested Reading List

Gopal, S, Haake, A, Jones, R.P. & Tymann, P. (2009) *Bioinformatics – A Computing Perspective*, McGraw-Hill, New York, USA.

ISBN 978-0-07-313364-5 and ISBN 0-07-313364-7 (hard back)

Krane, Dan E. & Raymer, Michael L. (2003). *Fundamental Concepts of Bioinformatics*. Benjamin Cummings, San Francisco, USA. ISBN 0-8053-4633-3 (softback).

Gibas, C. & Jambeck, P. (2001), *Developing Bioinformatics Computer Skills*, O'Reilly Press. ISBN 1-56592-664-1 (softback)

Pankhurst, R.J. (1991). *Practical Taxonomic Computing*, University Press, Cambridge. ISBN 0-521-41760-0 (hardback)

Bridge, P., Jeffries, P., Morse, D.R. & Scott, P.R. (1998) (eds.), *Information Technology, Plant Pathology & Biodiversity*, CAB International, Wallingford, UK ISBN 0-85199-217-X (hardback)

Watson, J. (2003), *DNA – The Secret of Life*, William Heinemann (Publishers), London, UK ISBN 0-434-01116-9 (hardback)

Page, R.D.M. & Holmes, E.C. (1998). *Molecular Evolution – A Phylogenetic Approach*, Blackwell Publishing, Malden, MA, USA. ISBN 978-0-86542-889-8 (softback)