
BNF 5106 / BIOL 5515 IOINFORMATICS

Course description

Major concepts and methods of bioinformatics. Topics may include, but are not limited to: genetics, statistics & probability theory, alignments, phylogenetics, genomics, data mining, protein structure, cell simulation and computing.

Textbook

Deonier RC, Tavaré S and Waterman MS. 2005. *Computational genome analysis*. Springer, New York. [ISBN-10: 0387987851; availability: <https://link.springer.com/book/10.1007/0-387-28807-4>]

Evaluation

Mini-review paper⁽¹⁾: 25%

Case study presentation⁽²⁾: 50%

Case study evaluations⁽³⁾: 25% (continuous; peer evaluation)

1. Students will write one short review (up to five pages plus one page of references) on an imposed topic, not covered in class.
2. Students will present one research seminar based on their thesis. A computational component is required.
3. Students write a 250-word abstract based on the case study presentation (two each week during second half of the term, except presenter; peer evaluated).

Times & location

Mondays	01:00-02:30	Zoom (authentication required).
Wednesdays	11:30-01:00	Zoom (authentication required).

Coordinator

Dr Stéphane Aris-Brosou
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Office hours: **by appointment only via MS Teams / Zoom.**

Syllabus

(Not contractual, subject to change without notice.)

Week	Lect.	Date	Topic	Instructor
1	1	Sep 8	- Introduction	Aris-Brosou
2	2	Sep 13	- Basics of Genetics (organisms, central dogma, genetic codes, promoters)	Aris-Brosou
	3	Sep 15	- Overview of Statistics I (random variables, distributions, likelihood. . .)	Aris-Brosou
3	4	Sep 20	- Overview of Statistics II (stochastic processes, inference)	Aris-Brosou
	5	Sep 22	- Pairwise alignments	Aris-Brosou
4	6	Sep 27	- Pairwise alignments and database searches	Aris-Brosou
	7	Sep 29	- Multiple sequence alignments [MSA]	Aris-Brosou
5	8	Oct 4	- Application of MSA I: model-based phylogenies, likelihood	Aris-Brosou
	9	Oct 6	- Application of MSA II: model-based phylogenies, Bayesian approaches	Aris-Brosou
6	10	Oct 11	- Application of MSA III: model-based phylogenies, clocks	Aris-Brosou
	11	Oct 13	- Hidden Markov models in bioinformatics	Aris-Brosou
7	12	Oct 18	- More machine learning in bioinformatics	Aris-Brosou
	13	Oct 20	- NGS for genomics and transcriptomics	Aris-Brosou
8	14	Oct 26	- <i>Study Week (no class)</i>	—
	15	Oct 28	- <i>Study Week (no class)</i>	—
9	16	Nov 1	- Case study [‡] : TBD	S1
	17	Nov 3	- Case study [‡] : TBD	S2
10	18	Nov 8	- Case study [‡] : TBD	S3
	19	Nov 10	- Case study [‡] : TBD	S4
11	20	Nov 15	- Case study [‡] : TBD	S5
	21	Nov 17	- Case study [‡] : TBD	S6
12	22	Nov 22	- Course evaluation; Case study [‡] : TBD	S7
	23	Nov 24	- Case study [‡] : TBD	S8
13	24	Nov 29	- Case study [‡] : TBD	S9
	25	Dec 1	- Case study [‡] : TBD	S10
14	26	Dec 6	- Case study [‡] : TBD	S11
	27	Dec 8	- Case study [‡] : TBD	S12

[‡]: a 30-minute presentation is given by each student based on his / her thesis research topic, followed by a discussion; remember to outline the biological question first, to provide the computational solution to a naïve audience (“self contained” presentation) and to give preliminary results where applicable; you will need to discuss and provide evidence of a good understanding of the potential limits of your approach. Following each presentation, non-presenter students write a 250-word summary ($\pm 10\%$) that is evaluated by both presenter and course instructor.

Please also note:

<https://www.uottawa.ca/administration-and-governance/policies-and-regulations/regulation-on-bilingualism>
<https://www.uottawa.ca/vice-president-academic/academic-regulations-explained/academic-fraud>