**COURSE: BIOL-432 Computation and Big Data in Biology**

**TERM: Fall 2025**

**INSTRUCTOR: R.I. Colautti**

**SUMMARY**:

Biology 432 builds on the pre-requisite content of Biology 343. In Biology 432, students develop advanced programming skills for machine learning, bioinformatics, and the analysis of large and complex datasets, with a particular emphasis on ‘omics’ data. The structure of the course is currently in flux to address learning challenges introduced by the availability of large-language models capable of writing advanced code. We currently use weekly quizzes and assignments to reinforce learning through self-guided tutorials and lecture content, and a final hand-written exam to test understanding. Weekly help sessions are run by TAs, who must be comfortable programming in R using packages taught in Biology 343: *dplyr*, *ggplot2, Rmarkdown, lm, glm, lmer,* and *gam*. The TA should also have a basic understanding of the content covered in Biology 432 including basic machine learning models in R (PCA, LDA, RDA, SVM, regression trees), working with DNA datasets (fasta, fastq, blast, alignments, dissimilarity matrices), and some experience interfacing with shared servers (SLURM or SGE, unix, python). The TA should have enough background knowledge to guide students to appropriate resources for troubleshooting, and to provide effective feedback on assignments and quizzes.

**DUTIES**:

1. Coordinate weekly help sessions to assist students in real-time with technical problems (e.g. software installation problems, typos, and other coding errors) and coding applications.
2. Provide timely feedback on weekly assignments in a timely manner (typically within 5 working days)
3. Assist with grading other major assignments and exams.
4. Maintain and update the course onQ site as required, including grading items.
5. (Time permitting) an option to gain teaching experience by leading one or more lecture sessions. This is not required for the course but can be requested by the TA.

**EVALUATION**:

The TA will receive a written evaluation provided by the Course Coordinator at the end of the course. This will include results of an informal feedback questionnaire about the TA administered by the Course Coordinator near the end of the course. The questionnaire will evaluate the TA’s preparation/knowledge, helpfulness, and teaching effectiveness.

**PROFESSIONAL CONDUCT**:

All Biology TAs are required to adhere to the University's Code of Conduct as described in Section 12 of the Queen's Graduate Calendar, and Section V of the Guide to Graduate Studies in Biology. As teachers of undergraduates, TAs are expected to recognize the seriousness of all forms of Academic Dishonesty, Harassment and Discrimination and to understand the rules governing such cases at Queen's.

**PROCEDURES FOR RESOLVING PROBLEMS BETWEEN TAs and INSTRUCTORS:**

If problems arise from the performance of TA duties, the TA and Instructor or Course Coordinator should attempt to resolve these difficulties in a timely fashion, as described in Section IV of the Guide to Graduate Studies in Biology. TAs should be aware that poor performance may lead to the loss of further contracts and guaranteed minimum support. If problems persist, the Undergraduate Coordinator, in consultation with the Graduate Coordinator, will be responsible for resolving the situation.

<http://www.queensu.ca/provost/faculty/facultyrelations/psac/collectiveagreement.html>