PCL3108H – Launchpad for Collaborative Projects in Artificial Intelligence and Drug Development

Topic	Collaborative Co-design of Projects in AI and Drug Development
Prerequisites	• PCL3107H – Foundations of Artificial Intelligence for Drug Development Scientists
Term	Winter term second session: February - March (6 weeks)
Coordinator(s)	Rebecca Laposa, Martin Beaulieu
Day & Time	TBD. 2h/week
Location	TBD
Course Description	This course is the second of two courses that will allow students from graduate programs in life sciences to acquire foundational knowledge for collaborative development and critical evaluation of AI approaches in drug development. This course will emphasize the practical growth of collaborative multidisciplinary skills. The course will apply foundational principles from PCL3107H to an applied setting. Students will participate in co-designing the research questions, research design and data architecture of authentic projects at the intersection of AI and drug development. Student teams comprised of students from life science Departments and the Department of Computer Science will collaborate to design and articulate the key research design steps required to launch a future collaborative research project. Tutorials will involve co-working sessions facilitated with expert guidance. Students in the life sciences will appreciate the priorities and research approaches of AI data scientists, in order to work together productively and effectively in future projects. Life science students will share their domain-specific scientific expertise and their perspectives about experimental validation with AI data scientists.
Learning Outcomes	By the end of the course, students should be able to: • Formulate specific research designs and plans for projects at the intersection of AI and drug development • Iteratively design the key elements and data architecture of a drug development research project that is compatible with AI approaches • Communicate and collaborate with AI data scientists. • Co-create and interpret code • Propose and design experimental validation of AI models

Evaluation	• Project plan (20%) • Midpoint code deliverable (30%) • *a downloaded synthetic dataset* • *a training script on one model* • Project report (30%) • *focused on articulating the alignment between your application, your datasets, your code and your proposed biomedical experiments* • Final oral presentation (10%) • Participation (10%)

Course Plan:

Date	Instructors	Session Topics (2 hr/session)
February	Chris Maddison Martin Beaulieu Rebecca Laposa	• Project planning. • Elements of project data architecture for best practice • Articulating high-quality research questions • Submit revised *Project Plan*
February	Maddison/Beaulieu/Laposa	• Identify a synthetic dataset that has all the key features and elements (inputs, outputs) that your project will need. This will be used to test your code, like a positive control • Develop a collaborative digital space for co-working sessions (e.g. Google Colab) • Begin to write version 0 of your model and your training script • Prepare to run code in subsequent weeks
March	Maddison/Beaulieu/Laposa	• Tips and tricks for successful code • Run code for the first time, start iterating. • Begin debugging at the level of software and at the level of machine learning • Progress to using a more authentic proof-of-concept dataset with biological relevance
March	Maddison/Beaulieu/Laposa	• Begin *in silico* experiments where you run your code on proof-of-concept data • Address constraints of data, limits of interpretation • Continue to iterate your code • Submit *Midpoint code deliverable*
March	Maddison/Beaulieu/Laposa	• Plan experimental validation of AI models (biomedical experiments) • Discuss alignment of AI and wet-lab data

March	Maddison/Beaulieu/Laposa	• Expand the experimental validation of AI models • *Final oral presentation* • *Project report*