Enhancing retention interventions with predictive analytics

Track - Technology, big data and the future of higher education

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Aims

- To introduce Ulster's historical approach to retention data and interventions
- To describe the vision for better data informed decision making in particular enhancing the annual cycle of reporting with real time, actionable data
- To demonstrate how Predictive Analytics supports this vision
- To introduce the solution - Blackboard Predict - and explain how the predictive model functions
- To share some experiences from the implementation phase of our predictive analytics project

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and…….

- To recognise the academic discomfort about neoliberal surveillance and compliant student populations.

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Learning analytics is also a layer on top of deeper, often hidden layers, assumptions, and beliefs regarding the function of higher education; how we define ‘learning’; how we measure and validate ‘learning’; the enclosing/capture of ‘learning’ on institutional learning management systems (LMSs); and how we see data, and the gender/race/epistemologies of those who develop the algorithms.

Responsible Learning Analytics, Paul Prinsloo, University of South Africa

https://www.slideshare.net/prinsp/responsible-learning-analytics-a-tentative-proposal

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Opinion

A machine learning algorithm is capable of predicting student success

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Strategic context at Ulster

- New Vice Chancellor (2015)
- New strategy – Five and Fifty (2016)
- New PVC Education (2016)
- Curriculum re-design processes
- New targets for retention, progression and attainment
- New course review processes
- Emerging focus on data based decision making and data democratisation.
  - Sharing tools
  - Sharing skills
  - Sharing responsibility

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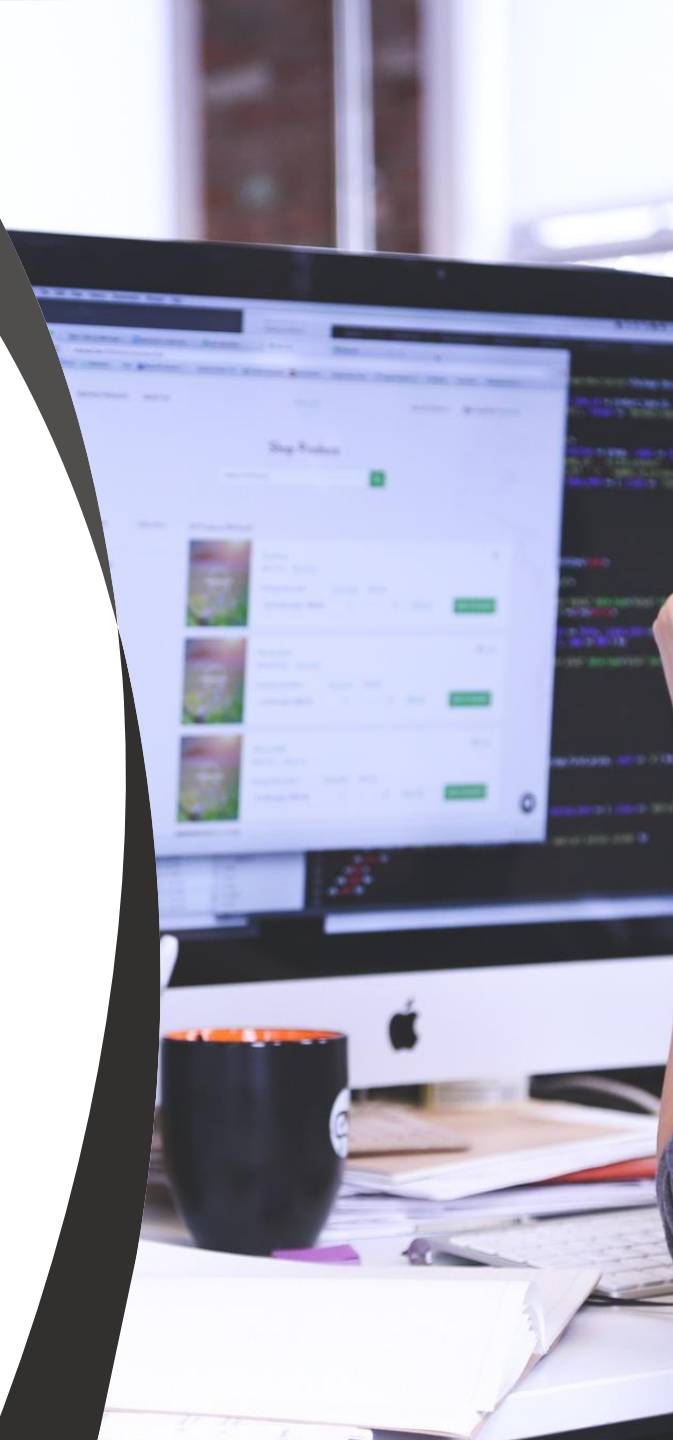
“The research and education sector is used to an annual reporting, decision-making and budgeting cycle centred on the academic year. This has served us well, but limits our ability to respond in an agile way to developing events.

There is huge potential gain from being able to respond quickly to an emerging opportunity, or to proactively address a developing problem.”

https://www.jisc.ac.uk/reports/the-future-of-data-driven-decision-making



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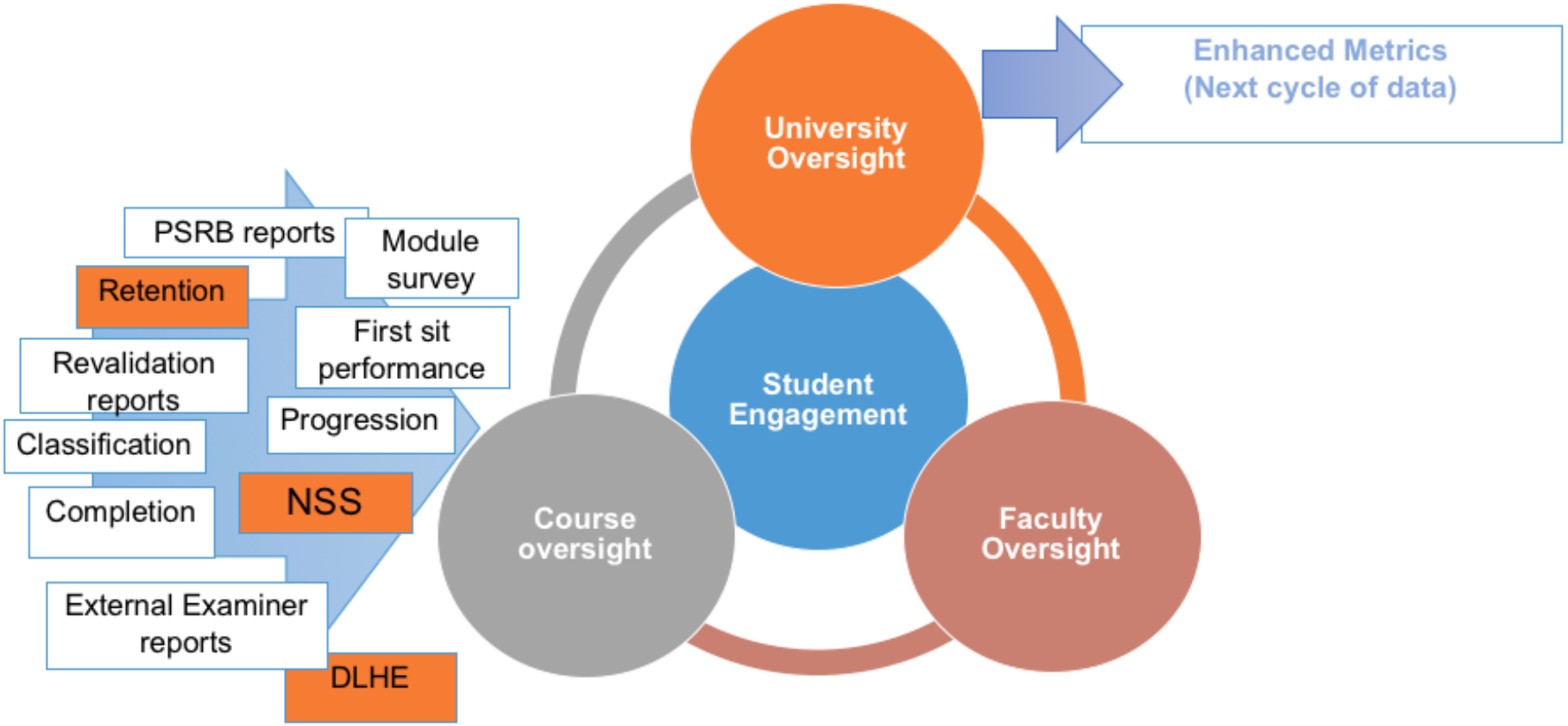

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Vision for Predictive Learning Analytics at Ulster

- To improve retention rates, progression rates and attainment.

- But also to improve conversations
  - To enhance the conversations we are having about learner data and to have these conversations sooner
  - To challenge ourselves to deal with institutional barriers, ethical, policy and governance issues around the use of learner data
  - To provide actionable data to any member of staff who supports a student

- to learn more about our own data, capacity and capabilities
  - Review the quality of our own data and begin to cleanse and understand it better. “Data hygiene”
  - To test and stretch our IT policy & governance
  - To talk more about causation and correlation and challenge some of our tacit assumptions – the myth of the incrementing student number

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Partnership with Blackboard

- Ulster partnered with Blackboard to be the first EU institution to implement Blackboard Predict. **Why?**
- Alignment with JISC Learning Analytics initiatives through Blackboard's involvement with the sector wide project.
- Alignment between Ulster's SRIS and the Predict data manifest.
- Make best use of the existing data already within Blackboard's managed hosting infrastructure.
- Integration with Blackboard Learn. Accessible dashboards embedded within existing workflows.
- Rapid deployment opportunity due to managed hosting project.
- Trusted and recent collaboration with Blackboard consultancy on the managed hosting project, which was well received by senior management.
- Complementary skills

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The Prediction

The question:
What students are likely to pass/fail a course with a 50% grade or higher.

The actual prediction is a question of "will student X get less than a 50% in a course?"

The result of the prediction is a probability that the student will not score greater than 50%.

What is displayed is the inverse of the prediction or the probability the student will succeed.

http://addl.ulster.ac.uk/predict/

Data sources

Applications, Banner and Blackboard

- Over 200 data elements from Admissions and Banner data
- Interactions within Blackboard
- The model does not rely on Blackboard interactions but those modules, and programmes, which make use of assessment and interactivity in the VLE will see more detail in the dashboards.
- Model based on 80% of 4 years of historical data, remaining 20% used to test predictions against known outcomes.

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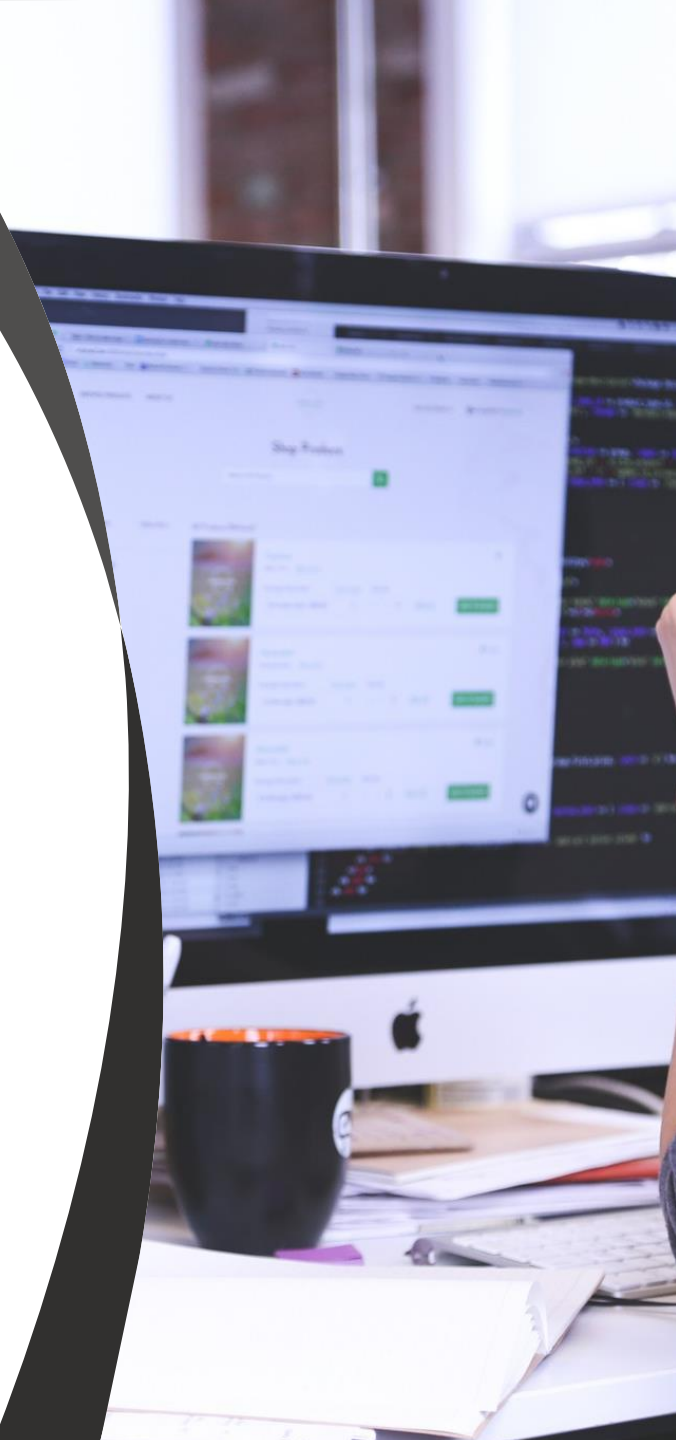
Ulster's Predictive Model

- Uses Random Forest machine learning algorithm
  - Result is a set of decision trees created using a random subset of features/attributes.
- For any given prediction, the data is passed through each tree in the forest, the resulting predictions are averaged to determine the final prediction for the case.
- None of these features/attributes are necessarily causal.
- Predict isn't capable of telling you why the student will fail the course, just that it is likely to happen.



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Model Segmentation

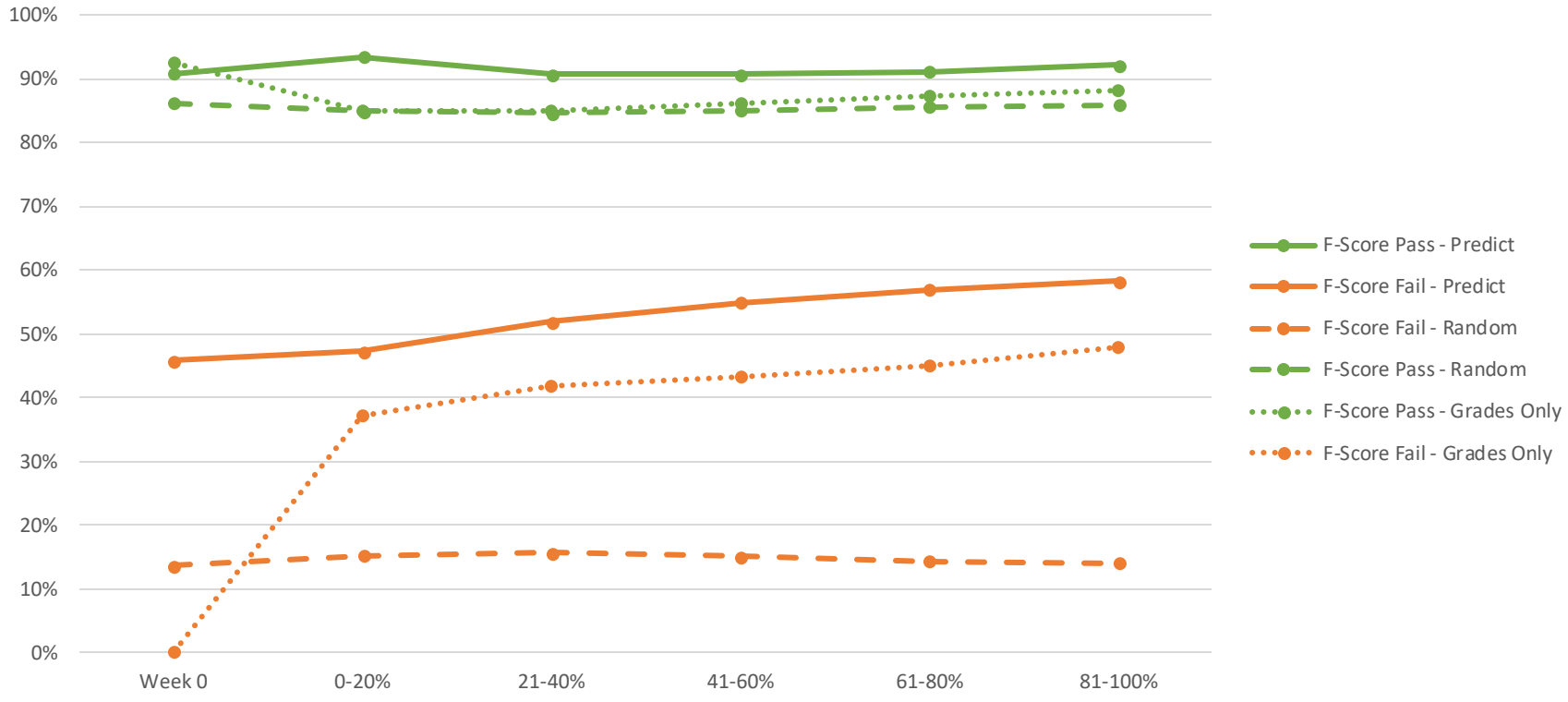
It is entirely possible, and indeed likely, that different students will be at risk at different times in the semester.

Predictions are therefore segmented by percent course complete.

This results in six segments, or different models for predicting the student success.

Week 0 - before the course starts
0-20% (ex: weeks 1-3)
20-40% (ex: weeks 4-6)
40-60%
60-80%
80-100%

F-Score Comparison (Benchmark)



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What we have learnt at Ulster

- Ownership of a learning analytics project is contested.
- The benefits of the project are not necessarily those that we defined at the start of the project.
- It is possible to get a pilot project established without the optimal team configuration.
- Dashboards really focus discussion.
- There is functional overlap between aspects of Predict and other reports and tools but the simplified UI is starting to change engagement patterns.
- Human judgement is essential – 'intuition or experience'?
- Predict helps start the conversation with a student, it can never hope to provide a 360 degree view of a human. Importantly we should not expect it to.
- Predict is part of a process and it is changing how we think about interventions and who has responsibility. The tool is only constructive when accompanied by intervention.

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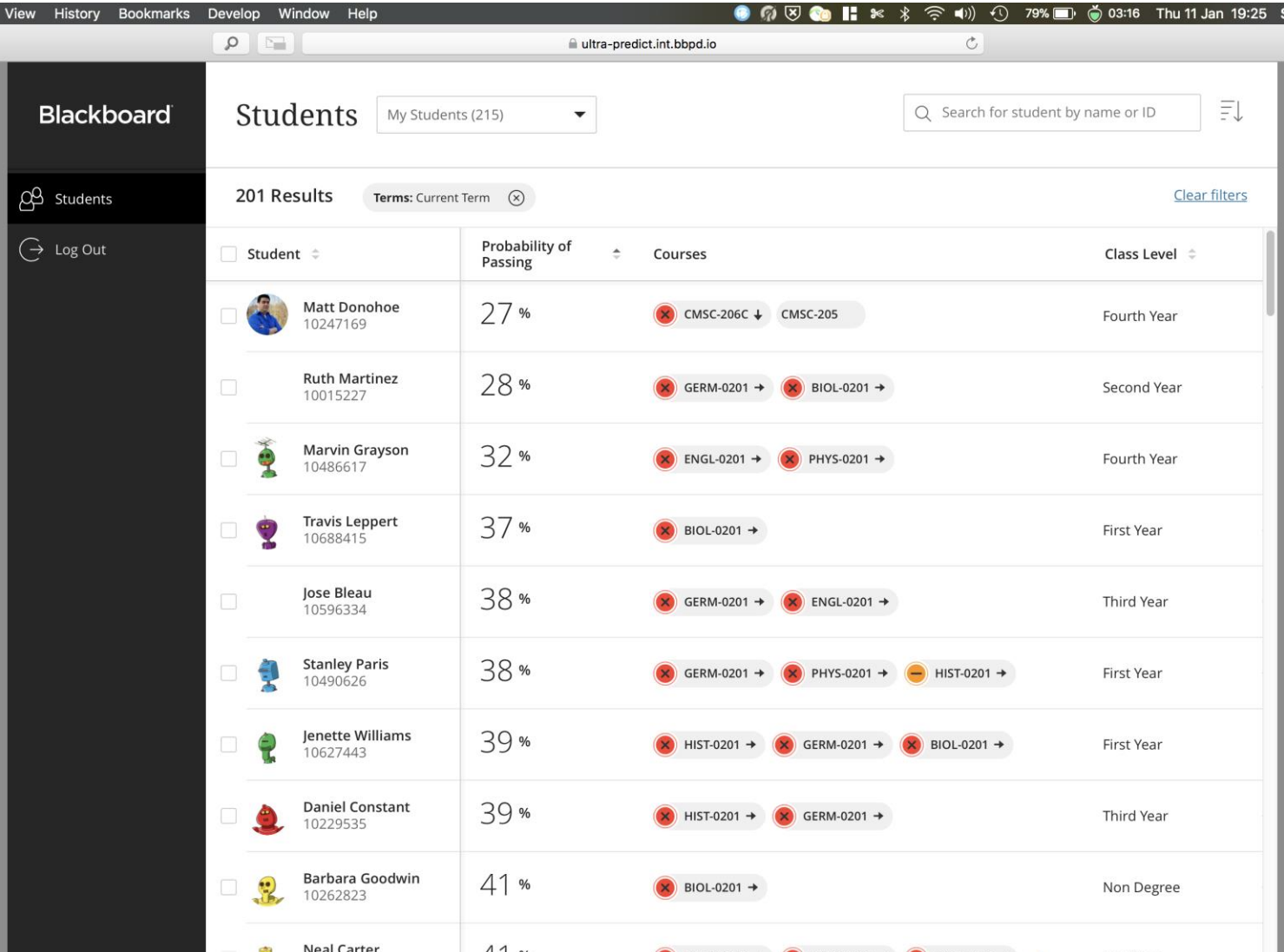
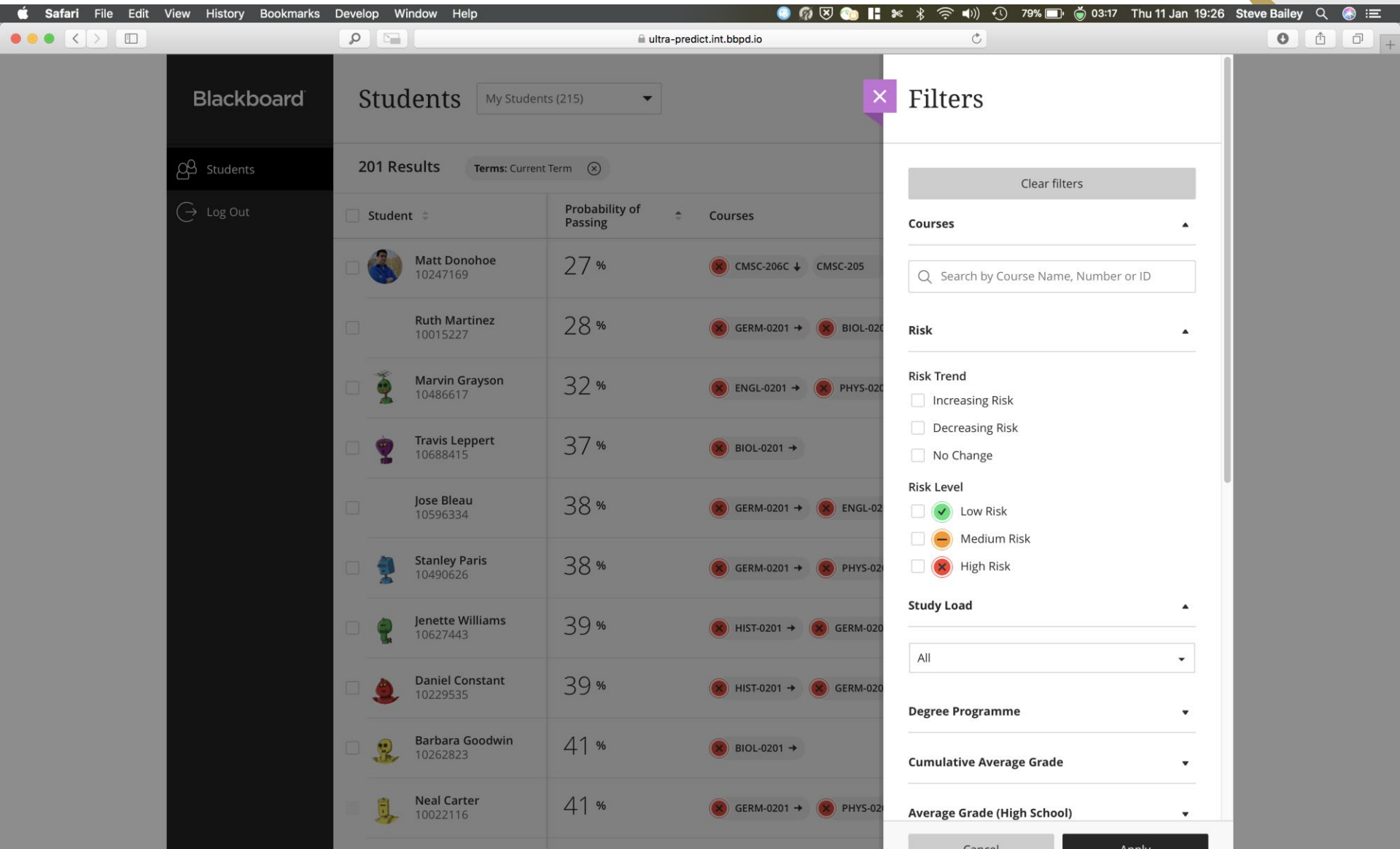
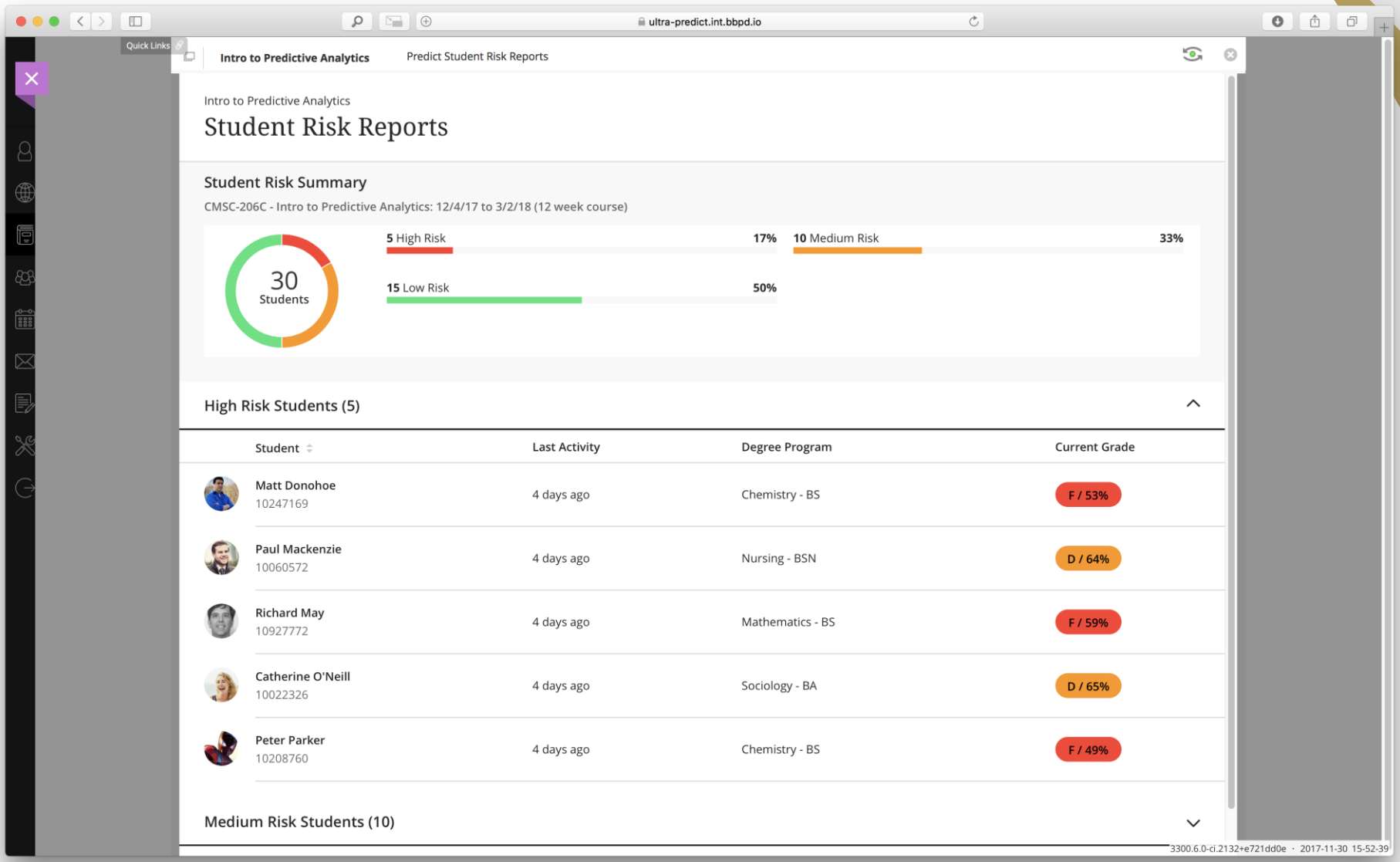
Global Advisor (University wide)



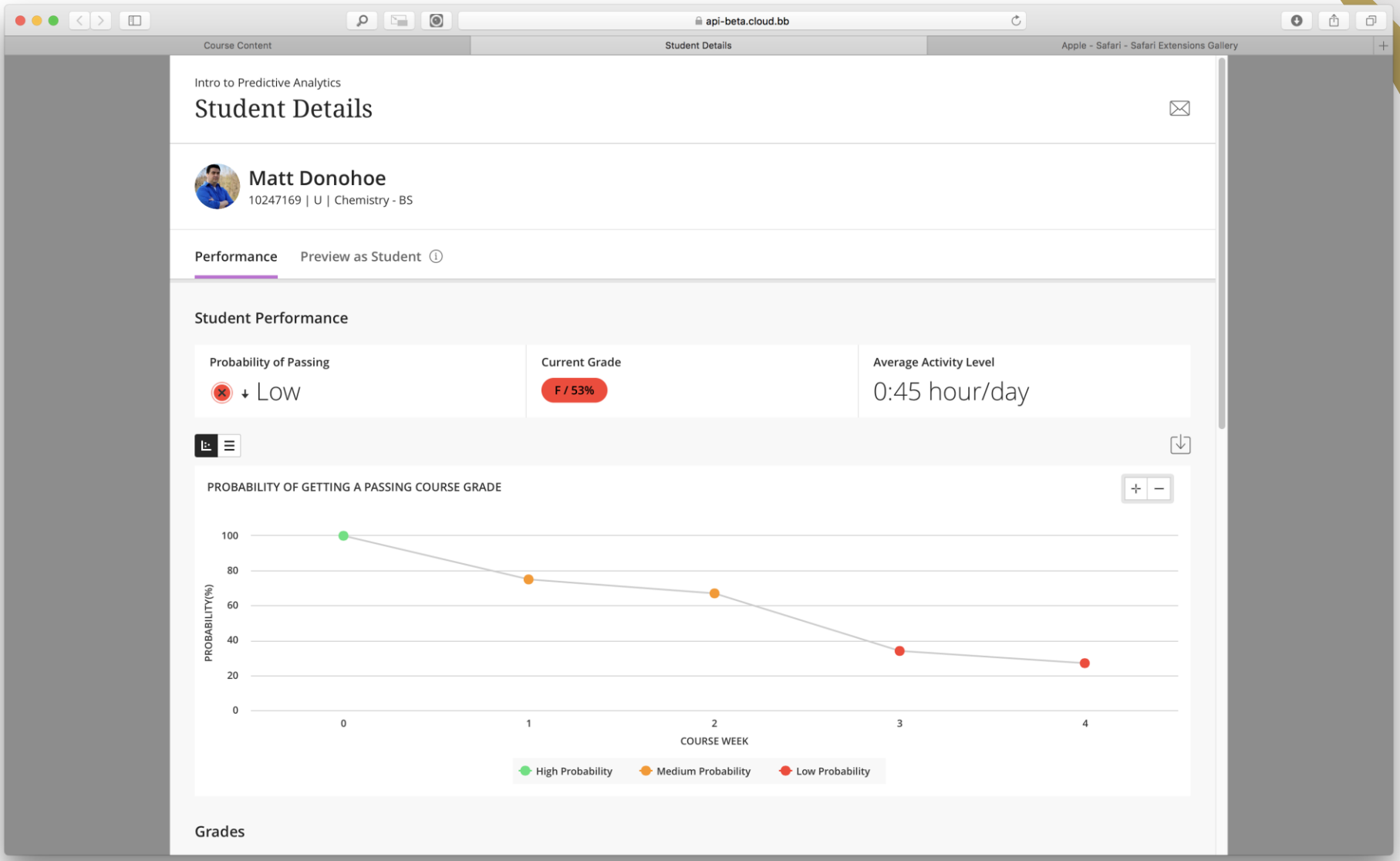
Global Advisor Filters



Student Risk Reports (Module)



Student Risk Report (Individual)



Student Risk Reports (intervention)