UBCourse VIS: INTERACTIVE VISUAL REPRESENTATION OF UBC COURSE PRE-REQUISITES

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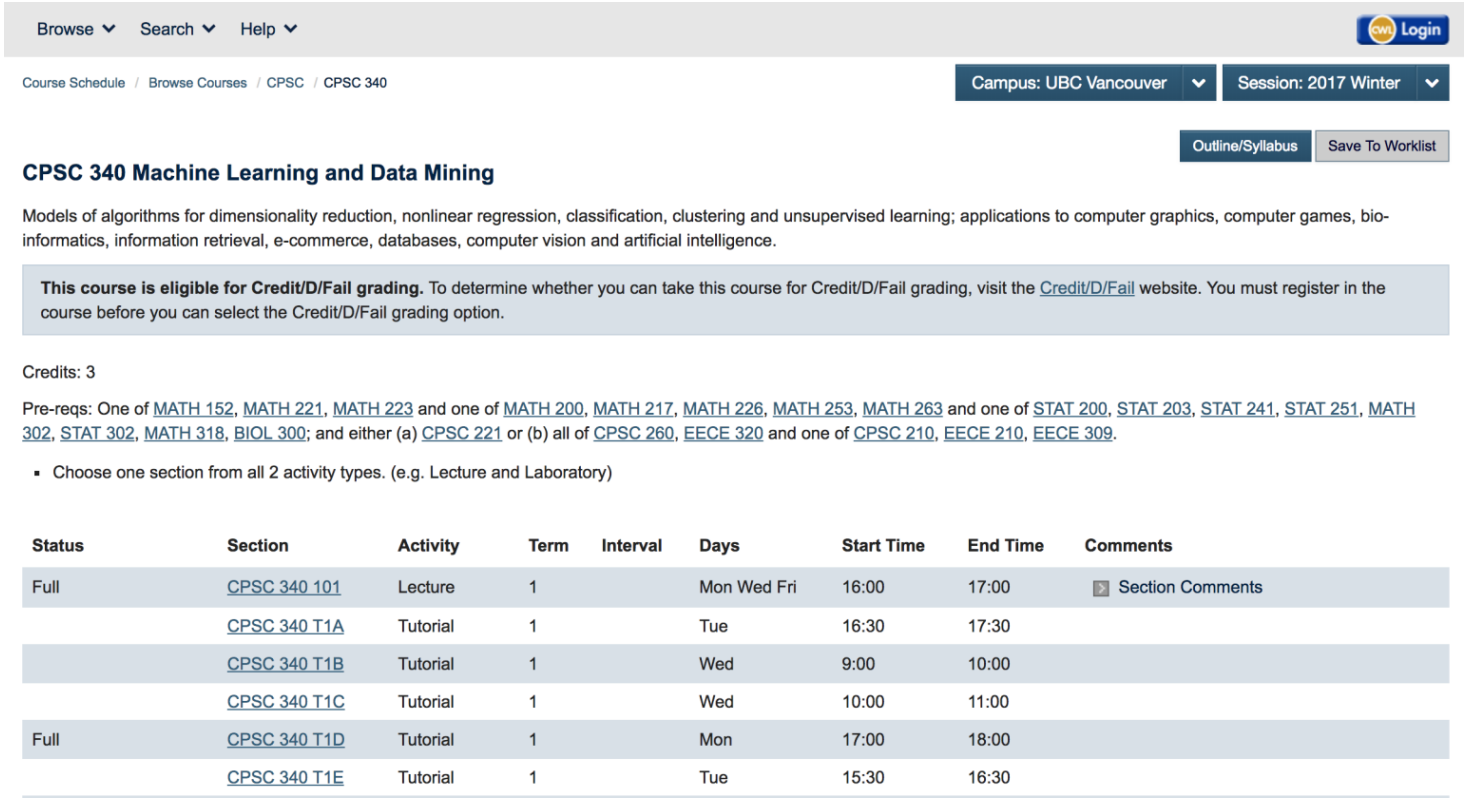
INSTRUCTOR: PROF. TAMARA MUNZNER

Dec 12th, 2017

INTRODUCTION



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Course Schedule / Browse Courses / CPSC / CPSC 340

Campus: UBC Vancouver Session: 2017 Winter

Outline/Syllabus Save To Worklist

CPSC 340 Machine Learning and Data Mining

Models of algorithms for dimensionality reduction, nonlinear regression, classification, clustering and unsupervised learning; applications to computer graphics, computer games, bio-informatics, information retrieval, e-commerce, databases, computer vision and artificial intelligence.

This course is eligible for Credit/D/Fail grading. To determine whether you can take this course for Credit/D/Fail grading, visit the Credit/D/Fail website. You must register in the course before you can select the Credit/D/Fail grading option.

Credits: 3

Pre-reqs: One of MATH 152, MATH 221, MATH 223 and one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263 and one of STAT 200, STAT 203, STAT 241, STAT 251, MATH 302, STAT 302, MATH 318, BIOL 300; and either (a) CPSC 221 or (b) all of CPSC 260, EECE 320 and one of CPSC 210, EECE 210, EECE 309.

- Choose one section from all 2 activity types. (e.g. Lecture and Laboratory)

Status	Section	Activity	Term	Interval	Days	Start Time	End Time	Comments
Full	CPSC 340 101	Lecture	1		Mon Wed Fri	16:00	17:00	Section Comments
	CPSC 340 T1A	Tutorial	1		Tue	16:30	17:30	
	CPSC 340 T1B	Tutorial	1		Wed	9:00	10:00	
	CPSC 340 T1C	Tutorial	1		Wed	10:00	11:00	
Full	CPSC 340 T1D	Tutorial	1		Mon	17:00	18:00	
	CPSC 340 T1E	Tutorial	1		Tue	15:30	16:30	

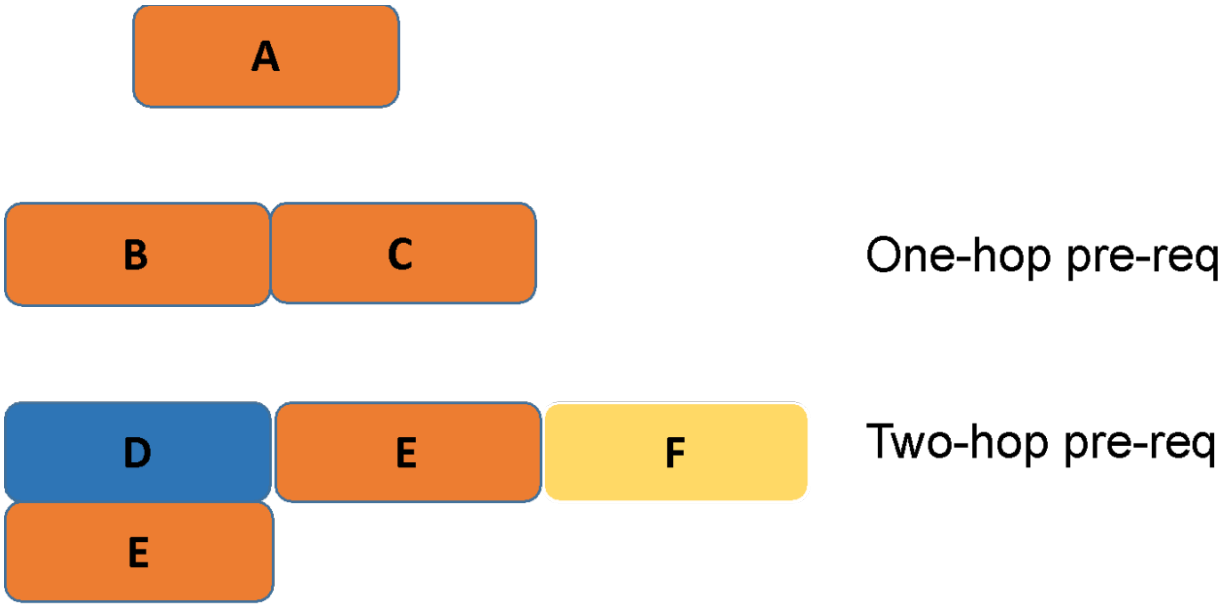
How can we visualize pre-requisites of UBC courses?

BACKGROUND

- Derive complex relationship of pre-reqs from plain text
  - Mandatory groups pre-requisite courses.
  - Either-or selections about groups of pre-requisite courses.
  - All courses or one of courses in these groups should be selected to satisfy required.
- E.g., 22 courses directly related to CPSC 340, with 6 groups of pre-requisite relationship in total.

BACKGROUND

- Pre-requisite courses of pre-reqs makes situation more complex
- Not all pre-requisite courses are needed depending on users' selection
- Duplicated/satisfied pre-requisites might appear
- Trade off between showing all information and neat design idiom



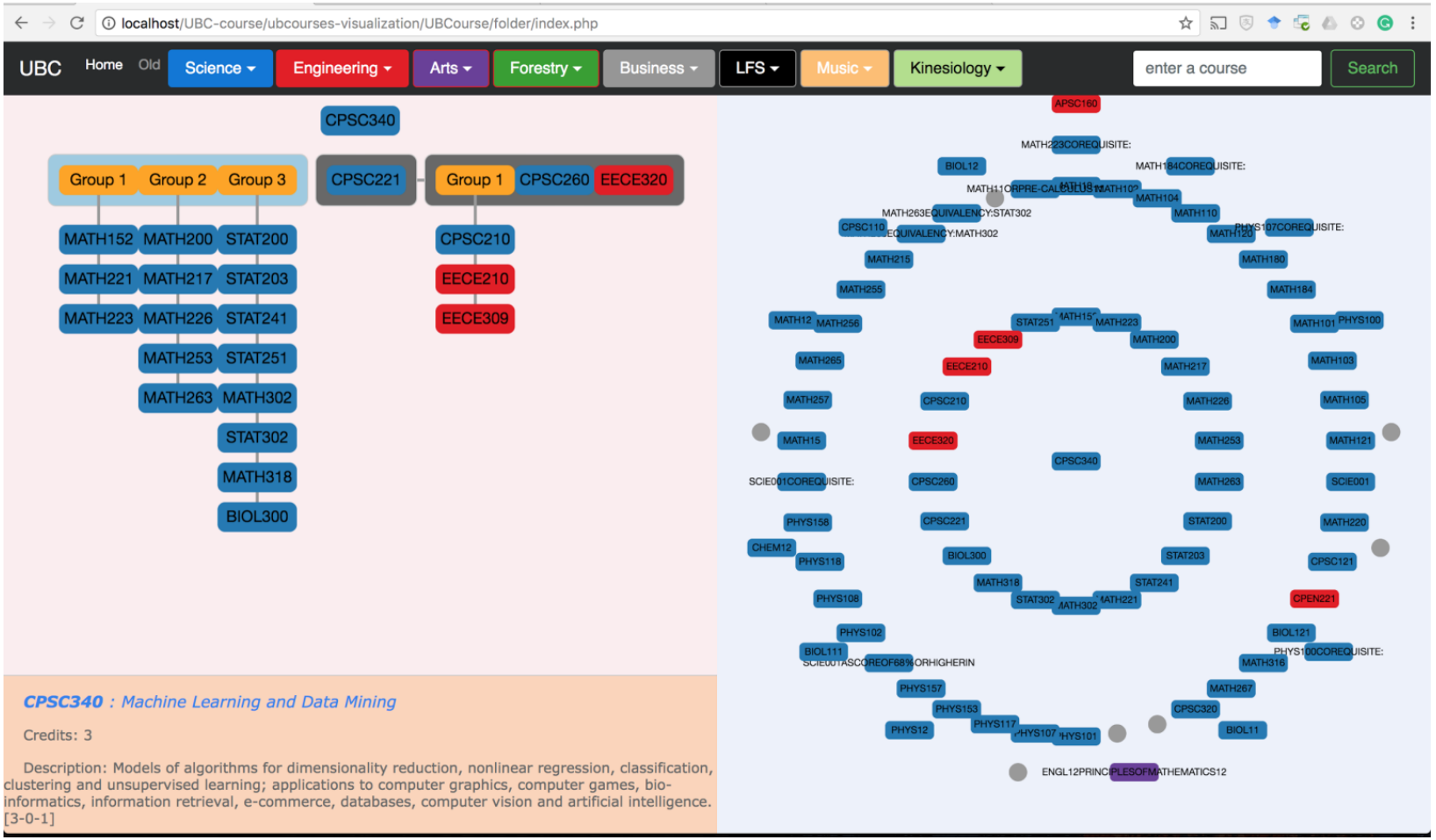
Multi-hop pre-reqs and duplicated pre-reqs

DATA TO VIS AND DERIVED RESULTS

- Dataset: UBC course schedule and description from UBC Student Service.
- Course pre-requisite relationship among courses provided by UBC
  - 7,521 courses; 8,381 relationships;
  - 6,931 mandatory pre-requisites;
  - 1460 either-or selections.
- Derived results
  - An interactive vis system, for exploring and making selections of courses

VAD Idiom	
What: Data	Network data with vertex and different types of edges
What: Derived	Pre-requisite courses and interactive selection
Scale	Thousands of courses and relations

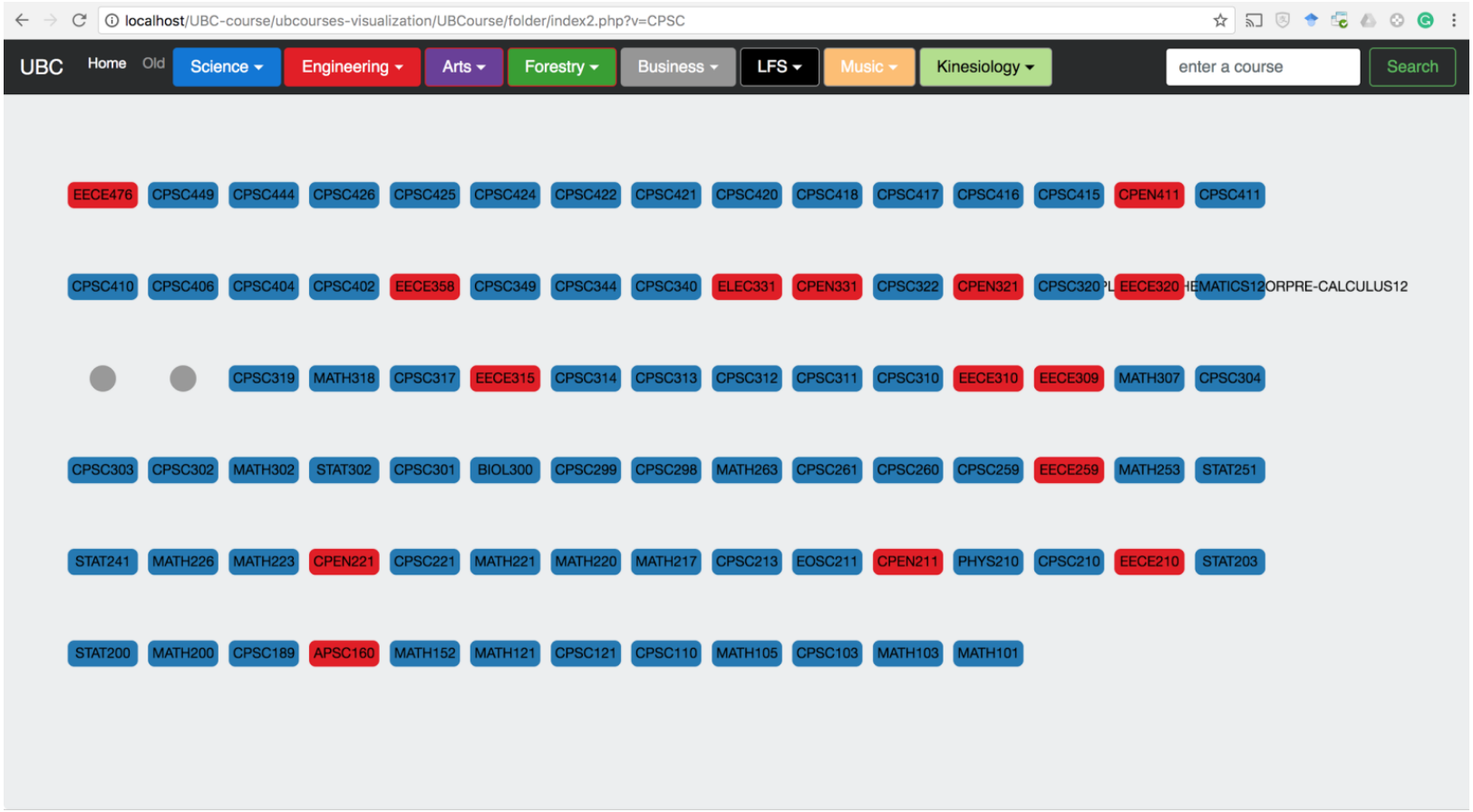
OVERVIEW



VAD Idiom	
How: Facet	Partition into multiple views: detail, overview and description

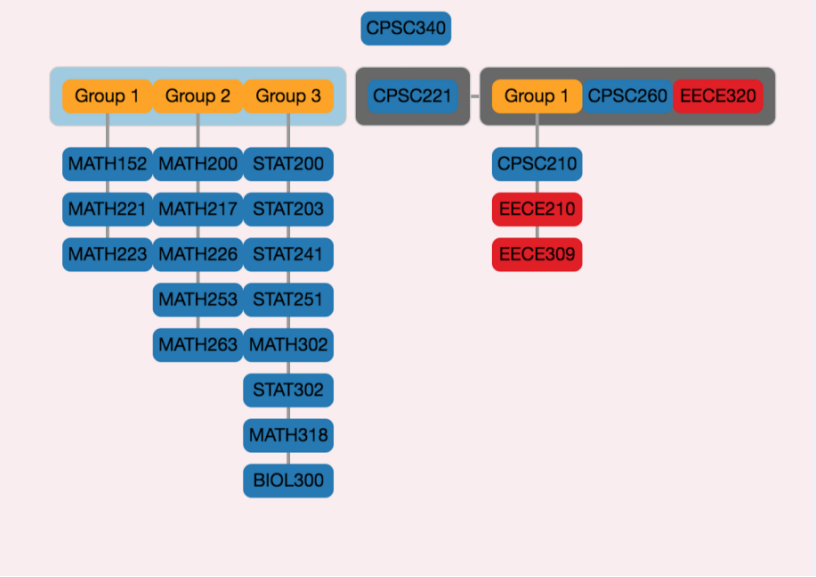
OVERVIEW

E


localhost/UBC-course/ubcourses-visualization/UBCourse/folder/index2.php?v=CPSC
UBC
Home
Old
Science
Engineering
Arts
Forestry
Business
LFS
Music
Kinesiology
enter a course
Search
EECE476 CPSC449 CPSC444 CPSC426 CPSC425 CPSC424 CPSC422 CPSC421 CPSC420 CPSC418 CPSC417 CPSC416 CPSC415 CPEN411 CPSC411
CPSC410 CPSC406 CPSC404 CPSC402 EECE358 CPSC349 CPSC344 CPSC340 ELEC331 CPEN331 CPSC322 CPEN321 CPSC320 EECE320 MATICS12 ORPRE-CALCULUS12
CPSC319 MATH318 CPSC317 EECE315 CPSC314 CPSC313 CPSC312 CPSC311 CPSC310 EECE310 EECE309 MATH307 CPSC304
CPSC303 CPSC302 MATH302 STAT302 CPSC301 BIOL300 CPSC299 CPSC298 MATH263 CPSC261 CPSC260 CPSC259 EECE259 MATH253 STAT251
STAT241 MATH226 MATH223 CPEN221 CPSC221 MATH221 MATH220 MATH217 CPSC213 EOSC211 CPEN211 PHYS210 CPSC210 EECE210 STAT203
STAT200 MATH200 CPSC189 APSC160 MATH152 MATH121 CPSC121 CPSC110 MATH105 CPSC103 MATH103 MATH101

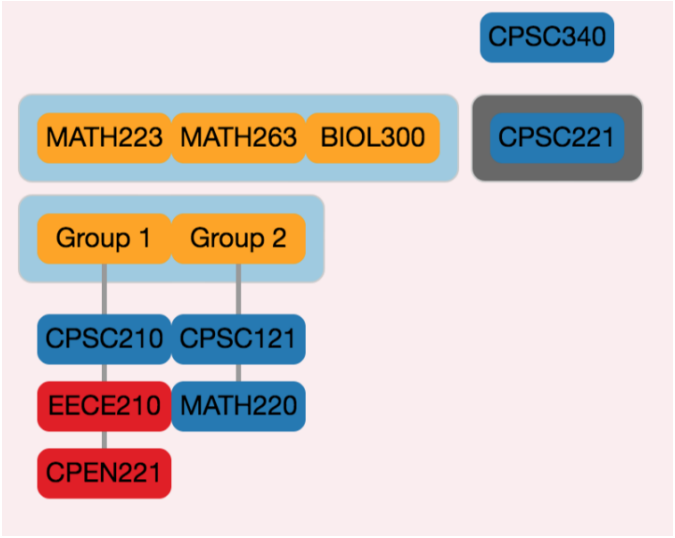
INTERACTIVE COURSE SELECTION

- By entering the course name, direct pre-requisites will be shown with detailed relationship.
  - Only one of courses in the vertical groups needs to be taken
  - Horizontal groups means mandatory pre-reqs or groups to be satisfied
  - Courses of different faculty has different color
  - Gray box means only one of either-or group should be satisfied
- Choose pre-reqs by name

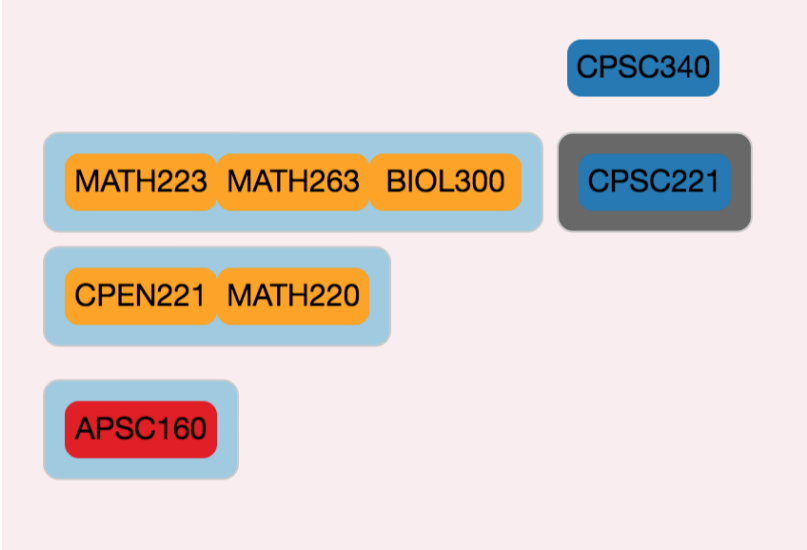


INTERACTIVE COURSE SELECTION

- After selecting preferred courses (orange ones), pre-requisites will automatically presented

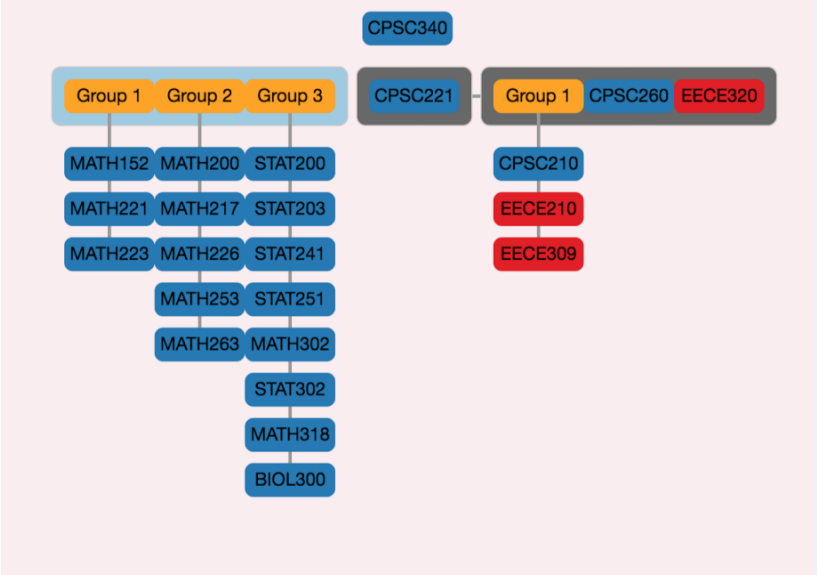


Selection of two-hop Pre-requisites



One pre-requisites selection for CPSC 340

INTERACTIVE COURSE SELECTION



VAD Idiom	
How: Encode	Node–Link Diagrams
How: Encode	Colors for different courses
How: Reduce	Duplicated/satisfied pre-reqs elimination
Manipulate: Navigate	Zoom in
Manipulate: Select	Select courses to take
How: Encode	Spatial position for mandatory and optional course

COURSE DETAILS

- Course details will be shown in this section:
  - Full course name
  - Course credits
  - Detailed course description

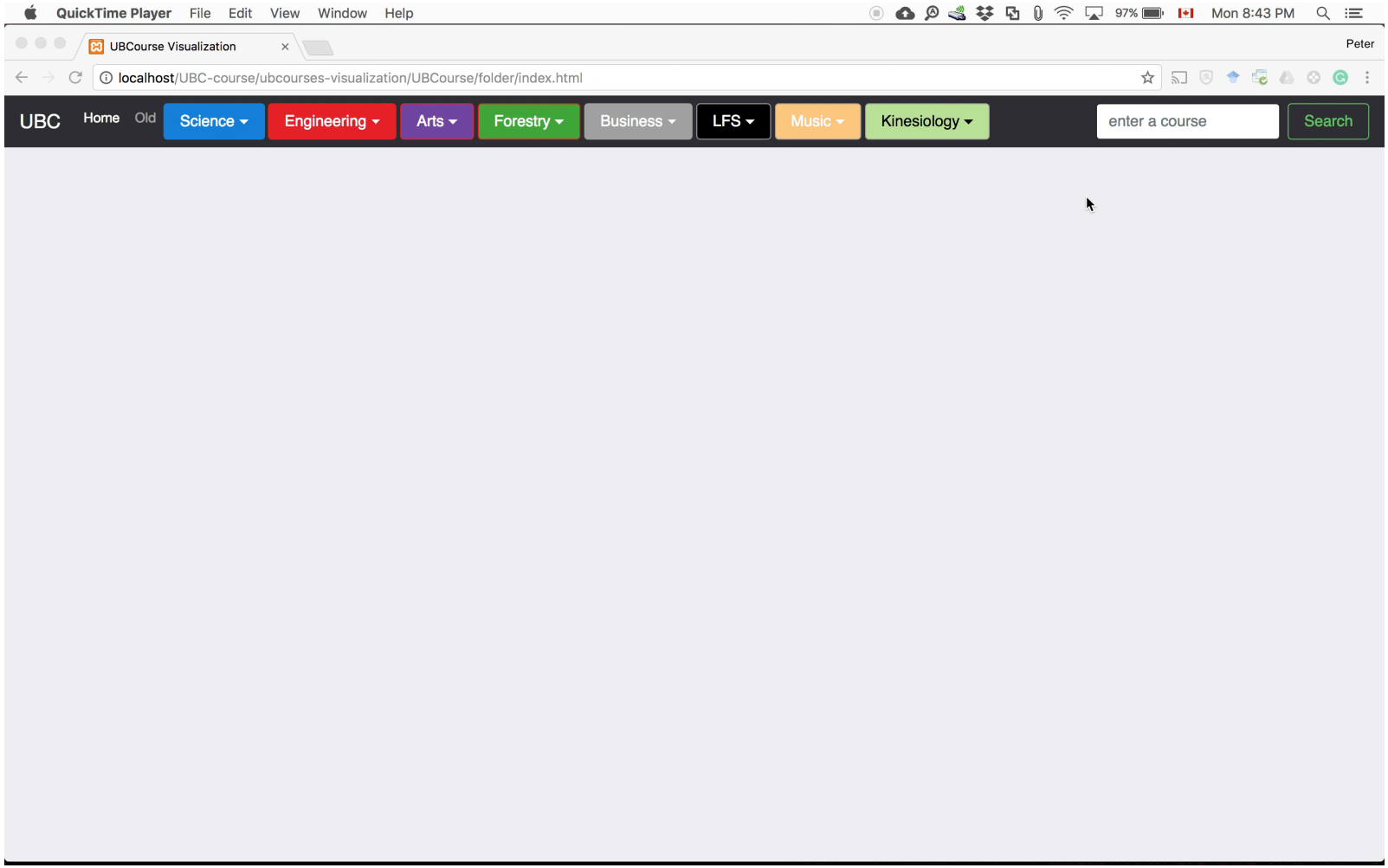
***CPSC340** : Machine Learning and Data Mining*

Credits: 3

Description: Models of algorithms for dimensionality reduction, nonlinear regression, classification, clustering and unsupervised learning; applications to computer graphics, computer games, bio-informatics, information retrieval, e-commerce, databases, computer vision and artificial intelligence. [3-0-1]

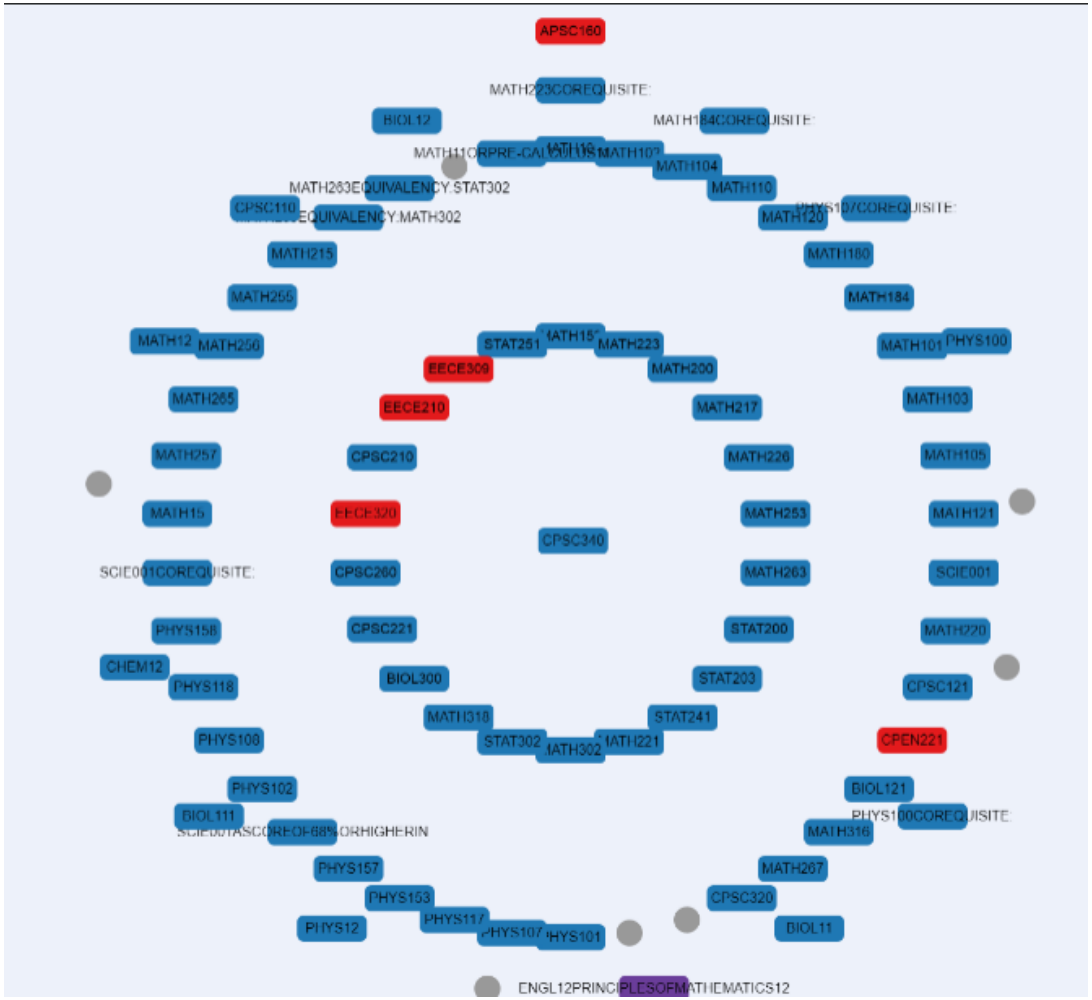
Detailed description of course

ILLUSTRATIVE USAGE SCENARIO



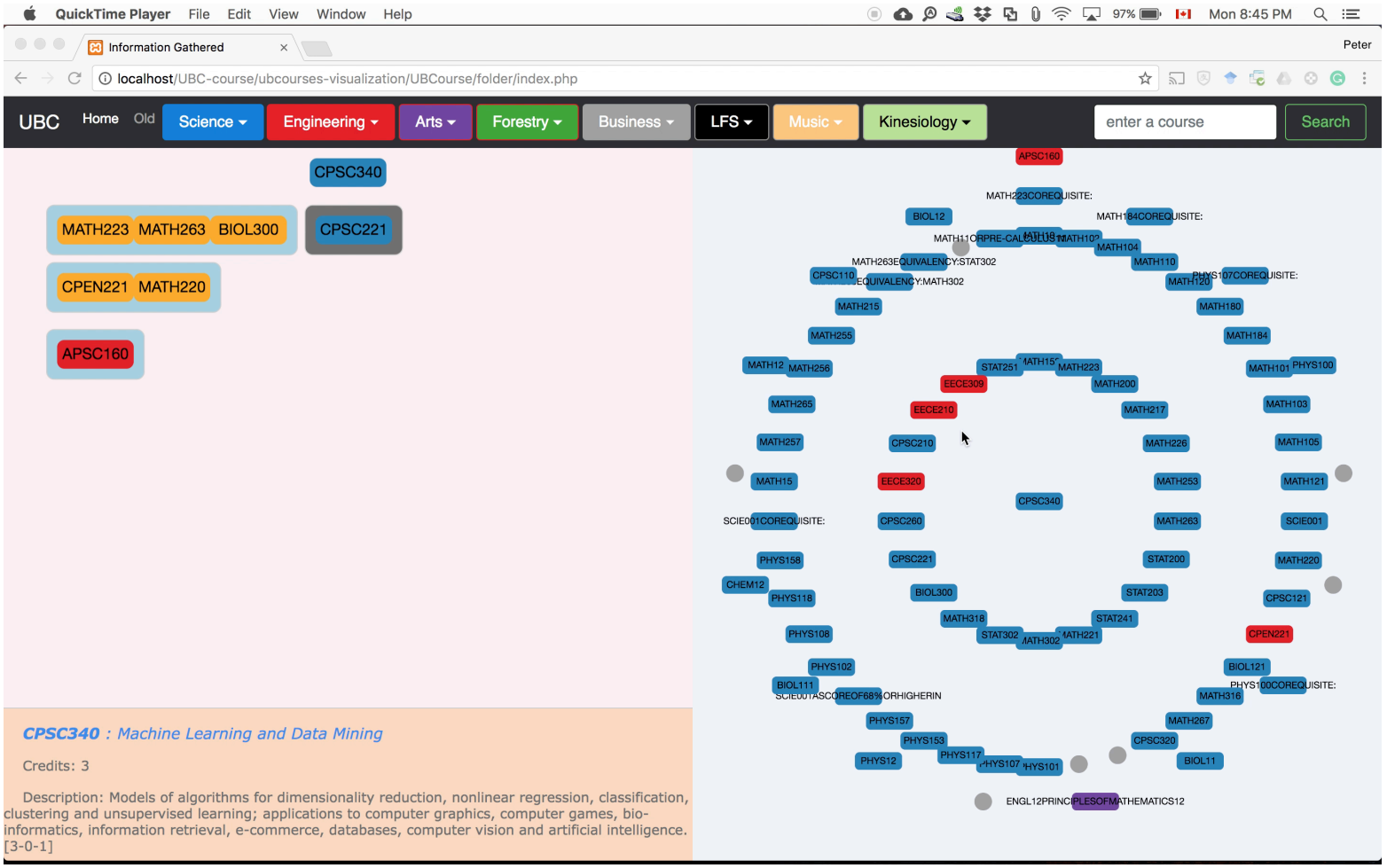
CONCENTRIC VIEW

- Query course centered
- Knowledge Hierarchy

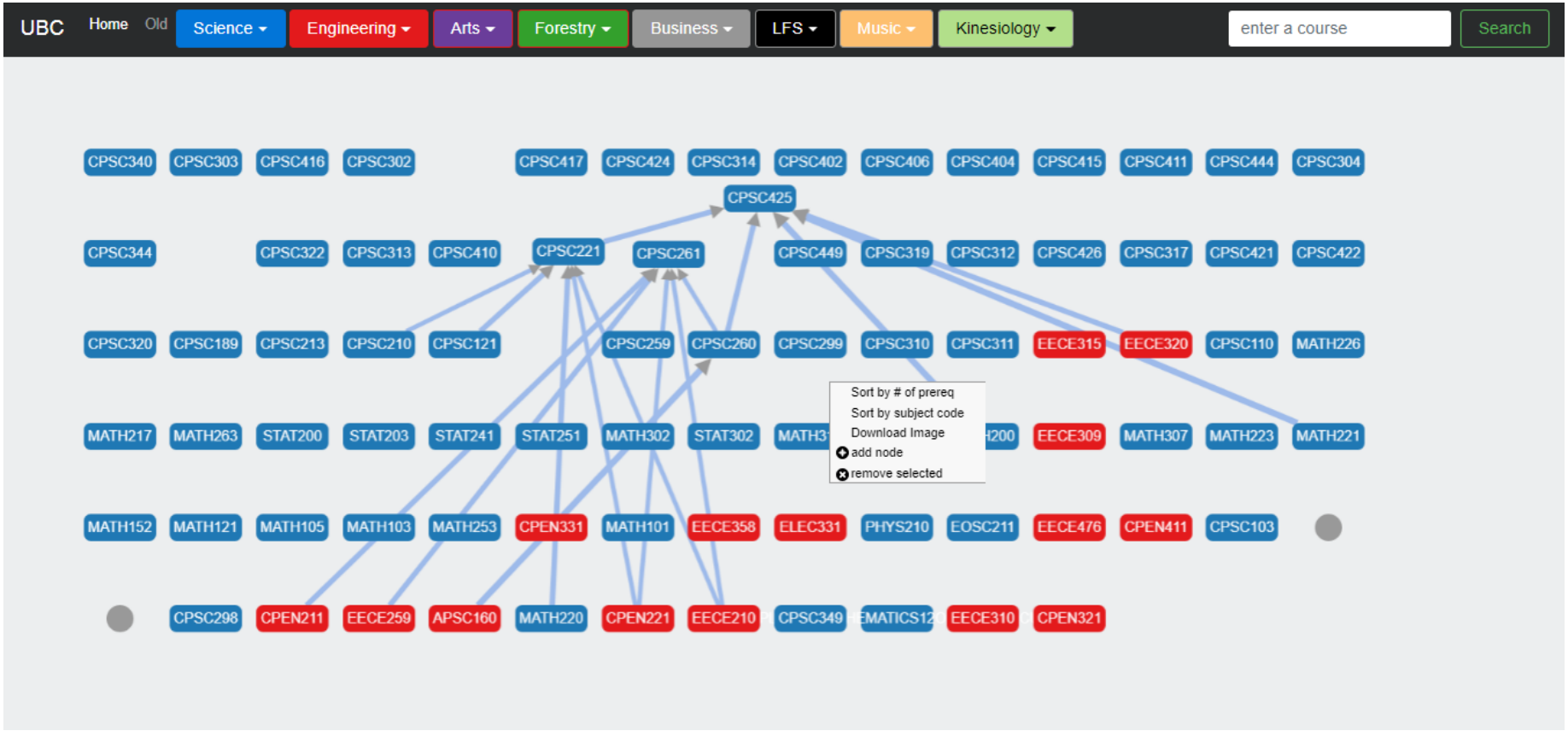


VAD Idiom	
How: Encode	Map hops(derived) to radial distance

ILLUSTRATIVE USAGE SCENARIO

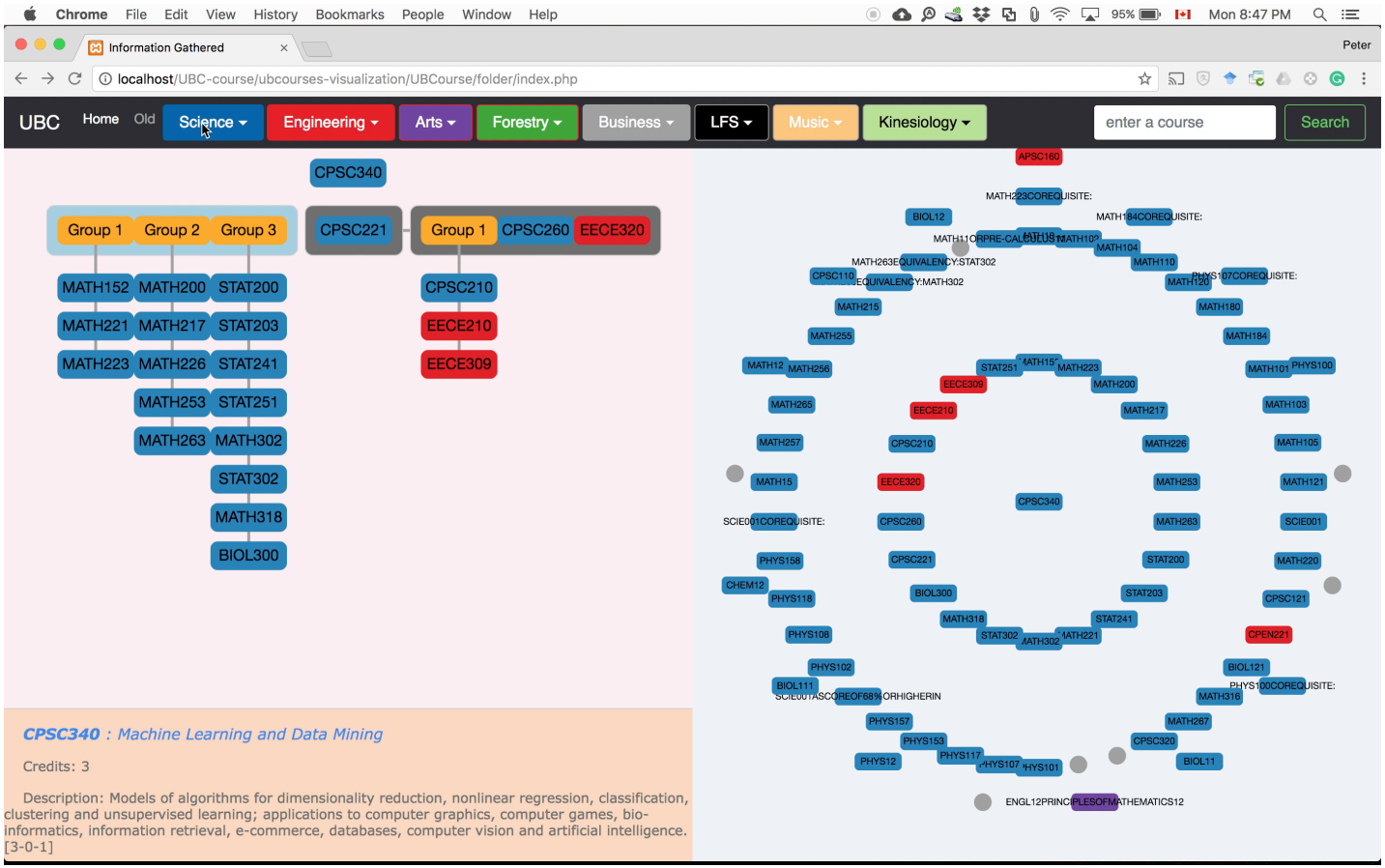


USER GENERATED NETWORK



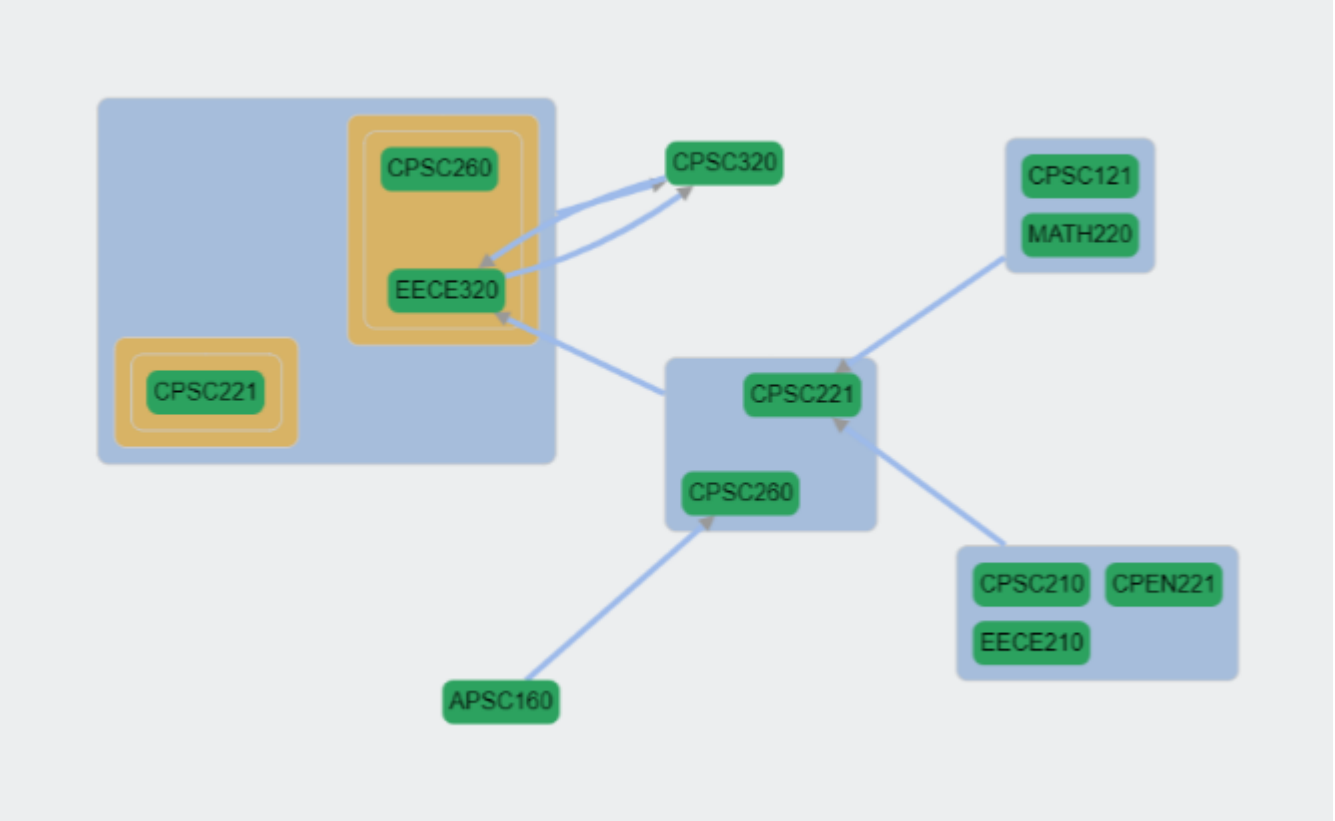
VAD Idiom	
How: Encode	Edge width encode logical relation strength
How: Manipulate	Sort, Select, Add, Remove

ILLUSTRATIVE USAGE SCENARIO

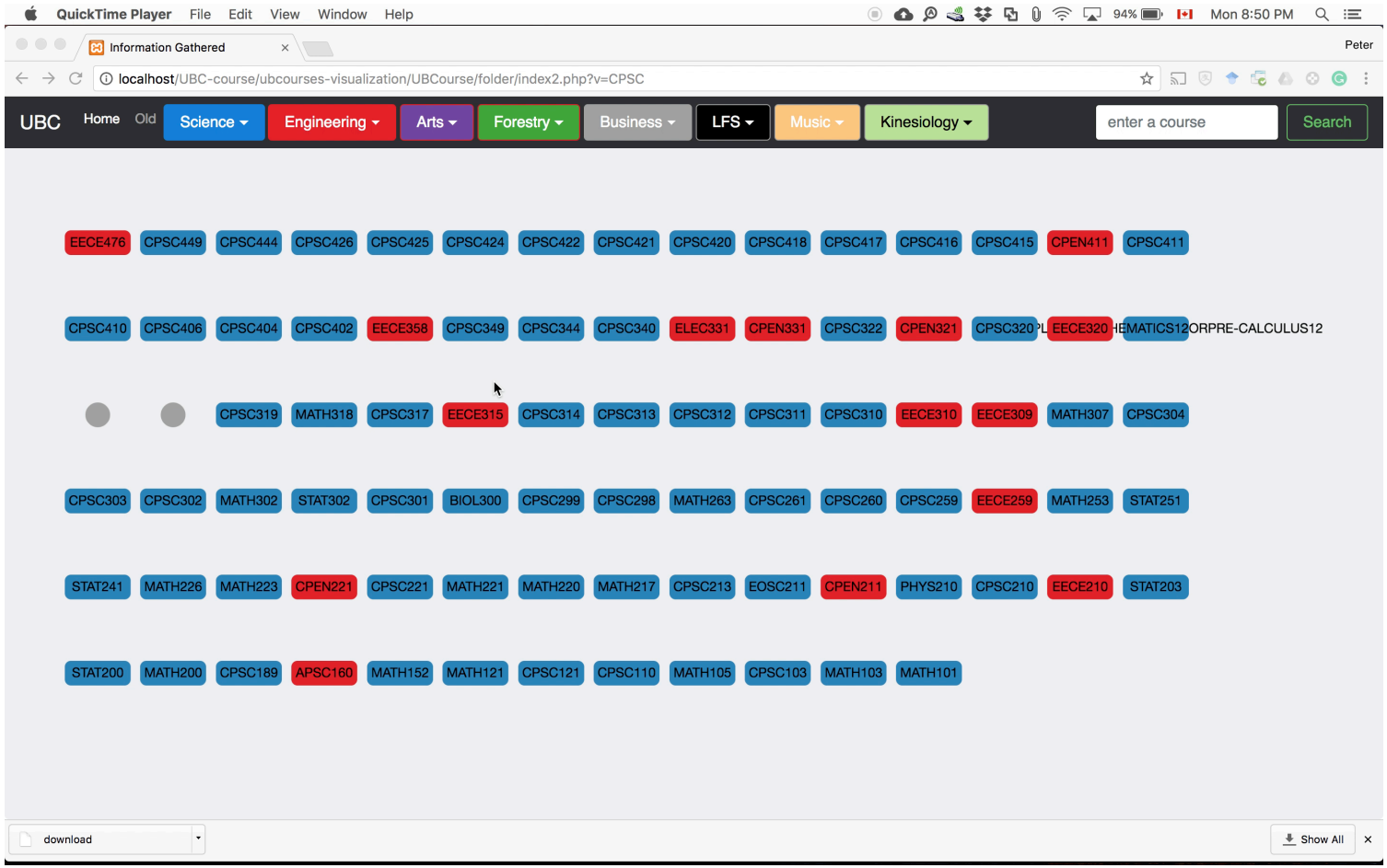


OUR PREVIOUS WORK

- Uses containers with different hues
- Encodes complete logical information
- Intuitively difficult to understand



ILLUSTRATIVE USAGE SCENARIO



CONTRIBUTION AND FUTURE WORK

- Contribution
  - Novel vis system for UBC course registration
  - Exploring and making selections of pre-req
- Future work
  - Course Explorer (Displaying prerequisites(predecessors) and post-decessors on demand)
  - Redesign database

THE UNIVERSITY OF BRITISH COLUMBIA

Thank you!