Data Science @ Winona State

Speaker: Chris Malone (cmalone@winona.edu)

Winona State University
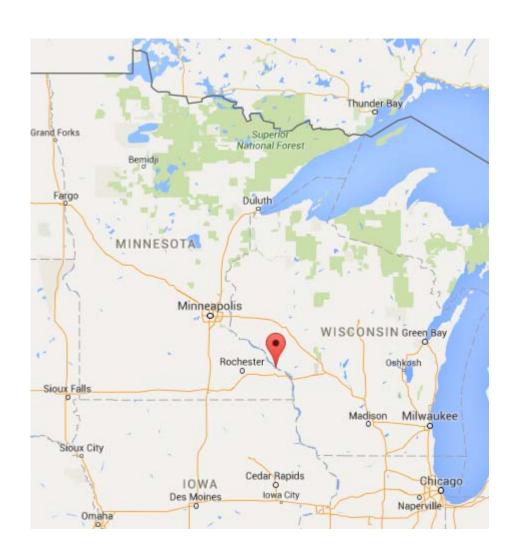
Linked in.

WINONA
STATE UNIVERSITY

8,500 students
- 7000 Winona
- 1000 Rochester
- 500 graduate

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- Data Science: 1 | 25
- Statistics: 7 | 50

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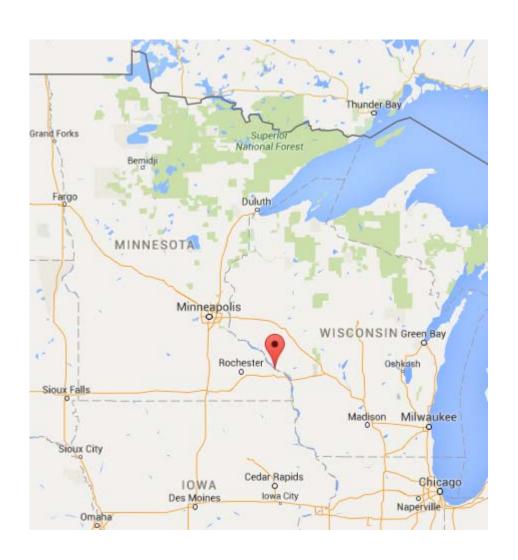
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Scale to 30000
  35 faculty / 325 majors

We are not
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Current Undergraduate Statistics Program

- Started about 30 years ago
- 7 faculty
- Nearly half of our graduates attend grad programs

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  - ~~Introductory Course~~   • Introductory Year

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  - ~~Introductory Course~~
  - ~~Survey Sampling~~
  - ~~Multivariate~~
  - ~~Nonparametric~~

  - Introductory Year
  - Study Design
  - Un/Supervised Learning
  - Professional Skills
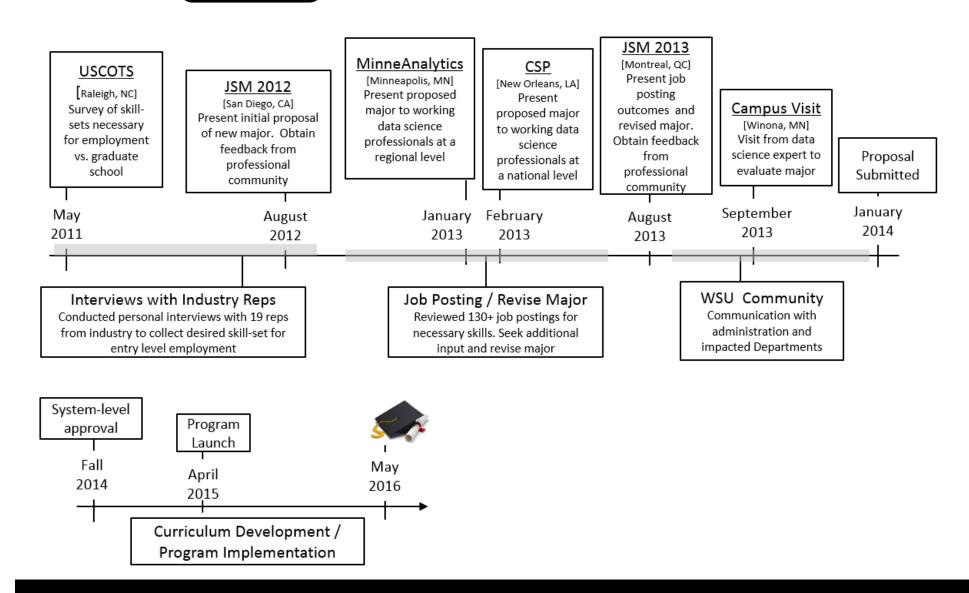
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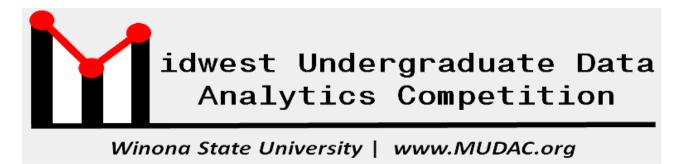
Last Program Review – 2010

Key Questions
- Is the curriculum evolving quickly enough?
- What characteristics should drive change?
- Are we sufficiently training students for employment and/or graduate school?

USCOTS
[Raleigh, NC]
Survey of skill-sets necessary for employment vs. graduate school

JSM 2012
[San Diego, CA]
Present initial proposal of new major. Obtain feedback from professional community

MinneAnalytics
[Minneapolis, MN]
Present proposed major to working data science professionals at a regional level

CSP
[New Orleans, LA]
Present proposed major to working data science professionals at a national level

JSM 2013
[Montreal, QC]
Present job posting outcomes and revised major. Obtain feedback from professional community

Campus Visit
[Winona, MN]
Visit from data science expert to evaluate major

Proposal Submitted

May 2011 | August 2012 | January 2013 | February 2013 | August 2013 | September 2013 | January 2014

Interviews with Industry Reps
Conducted personal interviews with 19 reps from industry to collect desired skill-set for entry level employment

Job Posting / Revise Major
Reviewed 130+ job postings for necessary skills. Seek additional input and revise major

WSU Community
Communication with administration and impacted Departments

System-level approval

Program Launch

Fall 2014 | April 2015 | May 2016

Curriculum Development / Program Implementation

Midwest Undergraduate Data Analytics Competition

Winona State University | www.MUDAC.org

- Started in 2012

- Models
  - ASA Data Analysis Competition of mid 1990s
  - COMAP: Mathematical Contest in Modeling
  - DATAFEST: Rob Gould, UCLA

Key Features of MUDAC

- Corporate partner motivates the problem, fields questions during the competition, and participates in the judging

- Teams of students have 24 hours to provide a solution

- Teams are judged/interviewed by corporate partner representatives, data science professionals, and faculty advisors

- **Professional development for students (and advisors)**

- **On-site job fair**

MUDAC 2016

- Teams from 17 different colleges/universities (currently limited to 2 teams per school)

- 100 students, 25 advisors, 40 working data science professionals assist with judging

- Budget: $12,500

Minne Analytics

Twin Cities Big Data, Data Science and Analytics Community

MUDAC has convinced us that

- undergraduates can do data science

- strong demand exists for students who possess these skills

- developing a comprehensive undergraduate data science program should be done

We are not
data scientists

Computational (17 credits)

Computer Science
- (3) Intro to Computer Science
- (8) Year-long sequence in object-oriented, high-level programming
- (3) Database Course

Data Science
- (3) DSCI 325: Management of Structured Data

Analytical (18 credits)

Data Science
- (6) Year-long sequence in data science, e.g. software, basic programming, data management, visualization

Statistics
- (6) Year-long sequence of introductory statistics
- (3) Regression Analysis

Mathematics
- (3) Applied Calculus

Domain & Professional Skills (18 credits)

Interdisciplinary component
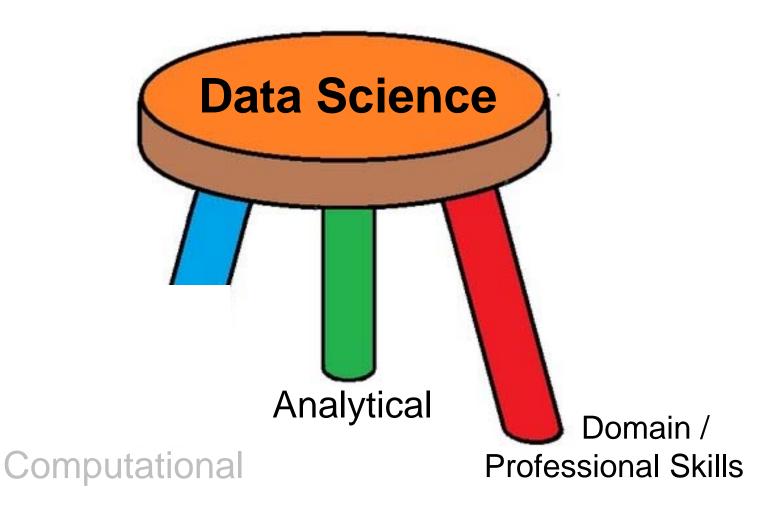- (12) Any discipline, 300+ level courses only
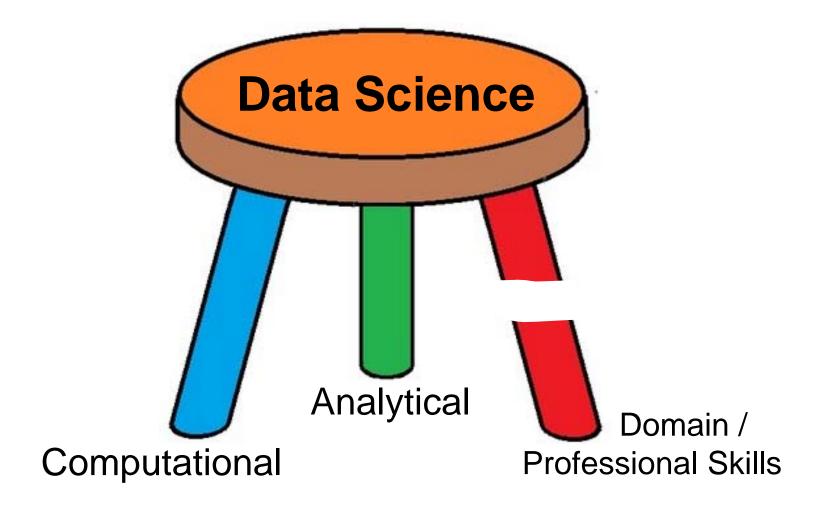
Professional Skills
- (3) Career development, communication, etc.

Capstone / Internship
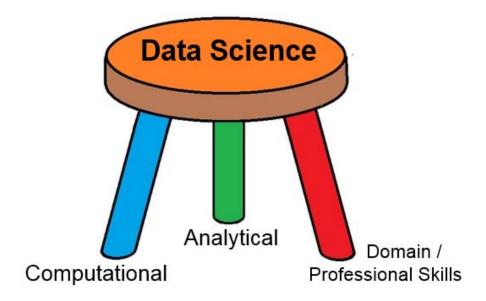- (3) Substantial independent project or internship

We are not data scientists

Data Science

Analytical

Computational

Domain / Professional Skills

Data Science

Computational

Analytical

Domain /
Professional Skills

1. Balance
2. Develop skills
3. Students do

~ **Thank You** ~

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Winona State University

Linked **in**.

(Very) Slow to Change

Years Ago	Author	Statement / Purpose
65	ASA President Wilks	"As business and industry become more complex executives will depend more and more on scientific statistical methods for collecting, analyzing, and interpreting information for decision-making."
33	Minton	Suggests training undergraduates is necessary to meet the demands of industry.
18	Higgins	Encourages the training of statisticians at the undergraduate level and proposes new curriculum
15	Moore	"our future depends on achieving a more prominent place in undergraduate education beyond the first methods course."

DSIC Example

Voice Mail Preview:

The following message is brought to you by school reach.

Hello from asphyxiation 12 taken either packing schools will be attending so I was great to go back at 10:25 every now and preschool kids clamber be okay at 8:30.

[Actual Voice Mail Message](#)

DSIC Example

Message per system

The following message is brought to you by school reach. Hello from asphyxiation 12 taken either packing schools will be attending so I was great to go back at 10:25 every now and preschool kids clamber be okay at 8:30.

Message per human ear

The following message is brought to you by School Reach. Hello from Rushford Peterson schools. Due to the weather R P schools will be starting 2 hours late tomorrow. School will start at 10:25. There will be no am preschool. Kids Club will be open at 8:30.