Data Science Ph.D. Degree Program at WPI

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WPI's Ph.D. Degree in Data Science

Across multiple departments and schools:
Computer Science Department
Mathematical Sciences Department
Foisie School of Business

with affiliated faculty from
Bioinformatics and Computational Biology Program
Electrical & Computer Engineering Department
Learning Sciences and Technology Program
Social Sciences and Policy Studies Department
(over 50 faculty in total)

Big Data - Big Opportunity

Exceptional opportunity :
Extracting insights from digital data is important for businesses, sciences, engineering, and solving societal problems.


- **Analytics Skills in High Demand : Jobs ***
- **Leverage our Momentum of MS Degree in Data Science**
- **Attract Top Student Talent to WPI**
- **Gain Access to Projects & Industrial Partnerships**
- **Leverage WPI Projects & Interdisciplinary Competencies**
- **Revenue Stream for WPI**

* McKinsley's Report 2012 ;   and Edu. Advisory Board Rep. 2013 (commissioned by WPI CPE)

Degree Programs in Data Science

- Existing Programs (approved Nov. 2013)
  - M.S. Degree
  - Graduate Certificate

- Proposed (Direct Extension of Above):
  - Ph.D. Degree

Data Science

Business Intelligence

Statistics

Computing

Concentration in Diverse Disciplines
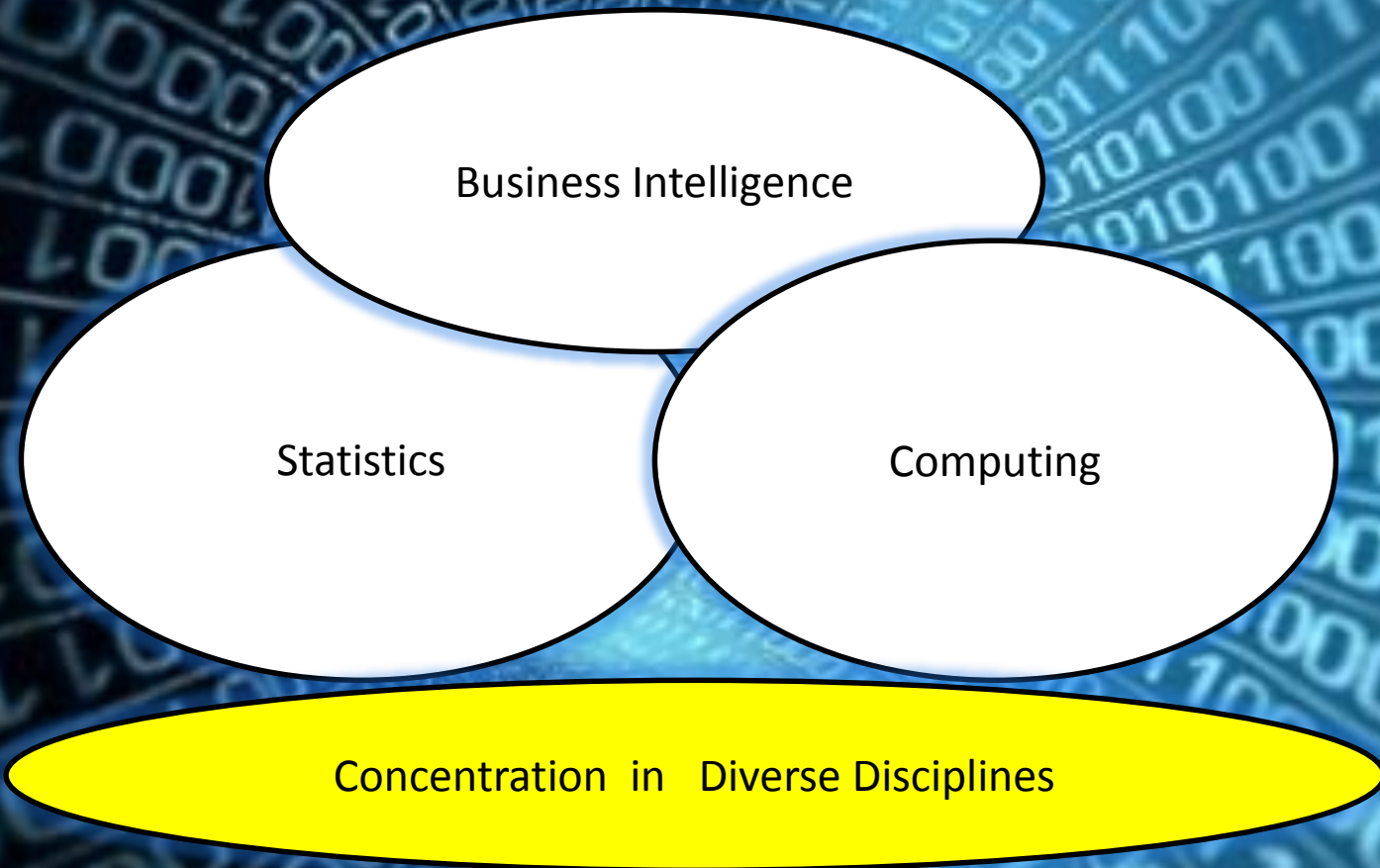
Data Scientists with Interdisciplinary Skills

Reminder: WPI Data Science M.S. Degree
(Graduate Level Work of 33 credits)

**Graduate Qualifying Project or MS Thesis
(3 to 9 credits)**

**Concentration and Electives
(9 to 15 credits)**

**Mathematical Analytics
(3 credits)**
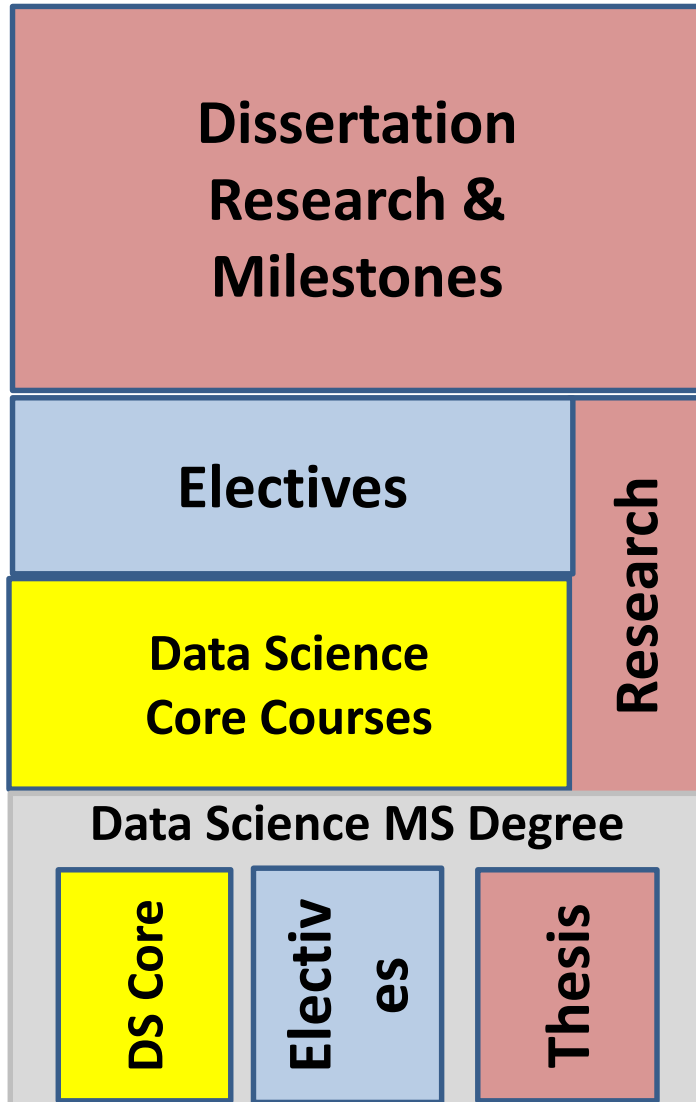
**Data Access & Management
(3 credits)**

**Data Analytics & Mining
(3 credits)**
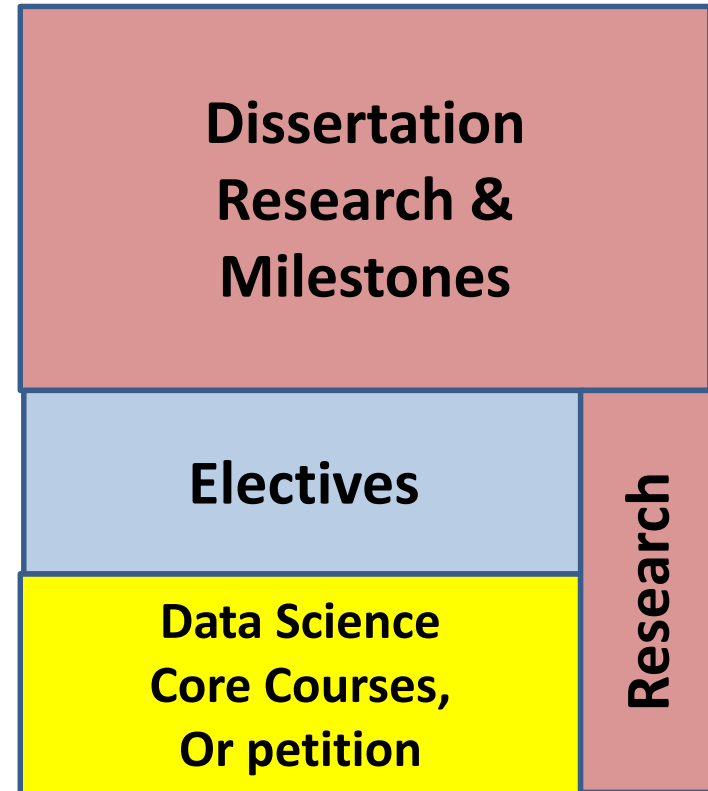
**Business Intelligence & Case Studies
(3 credits)**

Integrative Data Science (3 credits)

WPI Data Science Ph.D. Degree

Ph.D. 90

Dissertation Research & Milestones

Electives

Data Science Core Courses

Research

Data Science MS Degree

DS Core

Electives

Thesis

Ph.D. 60

Dissertation Research & Milestones

Electives

Data Science Core Courses, Or petition

Research

MS Degree Elsewhere

Ph.D. Degree Requirements

- Ph.D. 90:
  - Complete WPI MS in Data Science degree
  - Complete Ph.D. 60 requirements below (*)

- Ph.D. 60:
  - Core breadth competency [15 credits] (**)
  - Core depth competency [6 credits] (**)
  - Program electives [9 credits]
  - Research credits [30 credits]

(*) If requirement already met as part of MS, can petition to take alternate course.
(**) Must achieve 4 A and 3 B or above grades in 7 core courses.
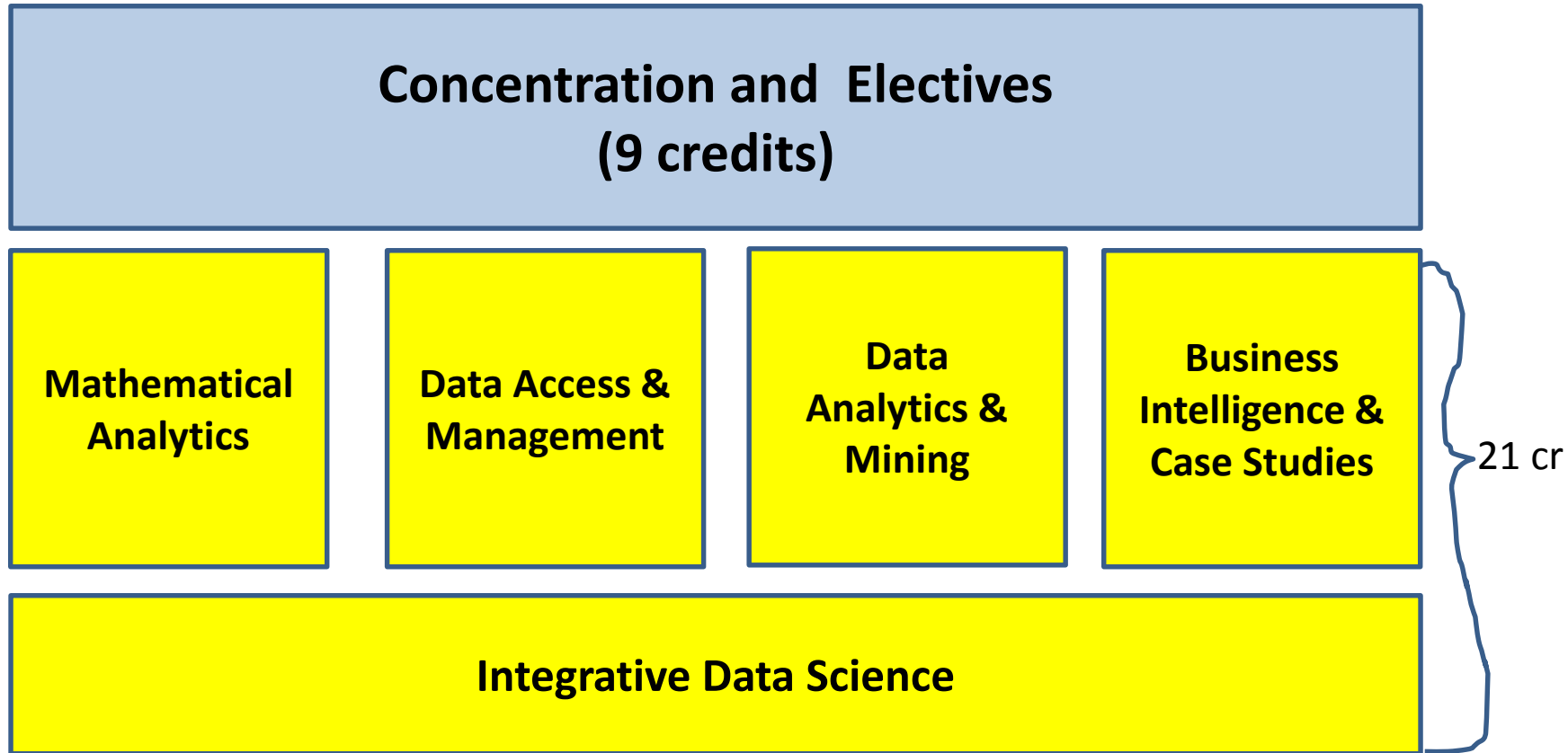
Ph.D. Degree Requirements

- Ph.D. 90:
  - Complete WPI MS in Data Science degree
  - Complete Ph.D. 60 requirements below (*)

- Ph.D. 60:
  - Core breadth competency [15 credits] (**)
  - Core depth competency [6 credits] (**)
  - Program electives [9 credits]
  - Research credits [30 credits]

(*) If requirement already met as part of MS, can petition to take alternate course.
(**) Must achieve 4 A and 3 B or above grades in 7 core courses.

Core Breadth & Depth Competency
(Graduate Level Course Work for Ph.D. 60)

Concentration and Electives
(9 credits)

Mathematical Analytics	Data Access & Management	Data Analytics & Mining	Business Intelligence & Case Studies

21 cr

Integrative Data Science

- Core breadth competency [15 credits]: 3 cr in each of five areas
- Core depth competency [6 credits]: 3 cr extra in two areas

Ph.D. Research Requirements (Ph.D. 60)

- **Ph.D. Qualifying Examination (within 1.0 year)**

  - Directed study; 1 primary and 2 assigned co-advisors

- **Ph.D. Committee Formation**

  - 4 members; at least from 2 core DS depts; one from outside WPI.

- **Ph.D. Dissertation Proposal (within 2.0 years)**

  - Proposal manuscript & presentation & examination

- **Ph.D. Dissertation Defense**

  - Dissertation manuscript & presentation & examination

Logistics

Program Growth & Assessment

- Flexible program enables natural growth:
  - Specializations: Health Care Analytics, Data Science for Smart Cities, Cybersecurity, etc.

- Data Science Advisory Board:
  - for external guidance, project recruiting, and employment opportunities

- DS Steering Committee:
  - establishes assessment plan and manages growth of program

Resources

Robust Revenue:

- Strong application pool for MS in DS (280 apps on april/2015)
- 35+ M.S. students per cohort; for ~70+ students in total a year
- Off-site CPE offerings at UTC is 15 M.S. students strong

Resources:

- **Available:** Initial Ph.D. launch can proceed without new resources beyond those already committed by administration & departments for managing strong MS cohort:
  - Several faculty hired for Data Science in last 2 years
  - Courses and course offerings established
  - Hardware and software being set up
  - Teaching assistants in support of courses and research
- **Needed:** To strengthen WPI's research and reputation in Data Science, on-going recruitment of top quality tenure-track faculty as well as additional TAs in Data Science important.

- Implementation Date: 2015/16

Questions?