The Challenge?

Data + computing + X... = “Infinite” ROI

Critical Systems increasingly dependent on Data Driven systems → robust, reliable and interpretable systems needed

Demand for Data Scientists and Data Engineers growing at ~39% ...

Higher Education needs to be nimble and responsive and its bachelors, graduate, certificate and executive programs need to be responsive -- IBM whitepaper – “The Quant Crunch”
The Challenge?

- Data processing → data analytics
- re-skilling essential for retaining ~260,000 New York jobs @ average salary of $120,404 likely to be impacted by disruptive data related technologies

- Curriculum Change and Innovation – Need an interdisciplinary approach to computing and analysis with “big data”
The Challenge?

Need a whole ecosystem

Knowledge & Skills Creation

Workforce

Multiscale Dissemination
VISION:

ICDS will be an international leader in creating, curating and disseminating data and computing related knowledge and skills.
ICDS is a partnership between UB’s Computational Data Sciences (CDSE) program and UB’s Center for Computation Research (CCR).

WHO IS ICDS?

ICDS is a partnership between UB’s Computational Data Sciences (CDSE) program and UB’s Center for Computation Research (CCR).

WHY WAS ICDS FORMED?
To better respond to the demand for skilled workers who can thrive in the rapidly evolving fields of information technology and data science.
Who is CDSE?

CDSE focuses on educating the next generation of cyberscientists to solve global challenges.

CDSE offers an interdisciplinary PhD program (6 schools) in Computational Data Sciences with 40+ associated faculty and 20+ funded projects.

CDSE also supports Masters programs with a focus in Data Sciences and Computing.
CCR, a leading academic supercomputing facility, maintains a high-performance computing environment, high-end visualization laboratories, and support staff with expertise in computing, visualization, and networking.

CCR is among the leading providers of academic computing research infrastructure in the nation with extensive NSF and State funding in addition to university investments.
## What do we offer?

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<td>MODULES</td>
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<td>“Just in time” skill oriented components</td>
<td>Programs in planning and place</td>
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<td>CERTIFICATES</td>
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<td>Ensembles of modules in market oriented focus areas</td>
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<tr>
<td>MASTER’S DEGREES</td>
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<td>Theory aware, practice oriented, terminal master’s degrees</td>
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<td>DOCTOR OF PHILOSOPHY</td>
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<td>Apex degree - theory focused with high end skills</td>
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**Programs in planning and place**

**Programs in planning**

**MPS in planning and test**

**MS in place**

**Program in place**
Modules and Stackables

What is it? Training sessions on current skills and core knowledge needed to analyze complex data and new technologies like deep learning and blockchain. Modules will be stackable into certificates and degrees.

How to complete it? Modules are approximately 9-15 hours and can be completed in 9 hour weekend and 5 x 3 hour week long sessions.

Admission requirements Academic Credit requires undergraduate degree.

WHO IS THIS FOR? Professionals and others with re-skilling needs are primary audience.
Master’s Degree: Master of Professional Studies (Data Science)

What is it? The MPS degree is skills oriented and trains in the practice of data, computing, and analysis. Students complete coursework, data science application survey class, as well as a project.

How to complete it? The degree can be completed in 1.5 years though 2 years provides for normal progression. Classes are held in the fall, spring and summer.

Admission requirements Admission requires undergraduate degree with some knowledge of math., statistics and computing. Bridge classes will be available for preparing student.

WHO IS THIS FOR? For students of ALL majors interested in Data Sciences skills.
Master’s Degree: Master of Science (Data Science)

What is it?
The MS degree trains students in theory and practice of data, computing, and analysis.
Students complete coursework, data science application survey class, as well as a project.

How to complete it?
The degree can be completed in 1 year though 1 ½ years provides for normal progression
Classes are held in the fall, spring and summer

Admission requirements
Admission requires undergraduate in engineering or natural sciences with some prior knowledge of mathematics, statistics and computing

WHO IS THIS FOR?
For engineering and natural/mathematical science students, the MS in Engineering Sciences (Data Science) may be a great fit!
Doctor of Philosophy: Computational and Data-Enabled Sciences

**What is it?**
Trains students to analyze big and complex data using high end computing and mathematically sound methodology.

**How to complete it?**
Is a full-time degree that requires the completion of 72 credit hours. Program can be joined part time or full time. Fellowship and research/teaching assistantships are available.

**Admission requirements**
Admission requires a master’s degree in ANY field.

**WHO IS THIS FOR?**
For students of ALL backgrounds who have a Master's degree.
Computational and Data-Enabled Sciences

Doctor of Philosophy: Computational and Data-Enabled Sciences

Interdisciplinary Research

• Integrating Network Science and Computational Topology with Applications in Neuroscience Data Analytics – M. Vaiana defended May 2018, Committee – MTH, EE, CSE; Neuroscience; contributions to neuroscience, Mathematics and Data Science

• Multi-scale Modeling for Data Sparsification and application to Greenland Ice Sheet Observations – P. Shekhar, Spring 2019, Committee – MAE, Geology, CSE

• Estimating Parameters of Non-linear Dynamical Systems in Pharmacology using Chaos Synchronization and Grid Search - N. Pillai Fall 2019 Committee, Pharm, MAE, STAT

WHO IS THIS FOR?

For students of ALL backgrounds who have a Master’s degree
Doctor of Philosophy: Computational and Data-Enabled Sciences

Time to Science & Quality

- Detection of Sub-Glacial Lakes in the Antarctic: New ideas using Dynamic Time Warping went from problem definition to solution and AGU talk in 3 weeks.

- Embedding CDSE students in disciplinary cohort leads to rapid uptake of data science methodology in domain and domain awareness of student.

- Students lead the way into many new collaborative efforts!

- Balanced mix of Computing, Data Sciences and Mathematics!

WHO IS THIS FOR?

For students of ALL backgrounds who have a Master’s degree
End to End Education/Research

- PhD program is the anchor to the excellence in ICDS
- Unique and high quality research outcomes $\rightarrow$ reputation, $$ etc.
- New modes of inquiry are transforming disciplines
- MS, MPS, MA and MFC provide a [0- ] range and stable revenue base
- UB is a LEADER!

WHO IS THIS FOR?
For students of ALL backgrounds who have a Master's degree
For more information contact us:

cdse@buffalo.edu