Orientation

Biomedical Informatics Graduate Program

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Overview of today's activities

- Welcome and introductions
- Overview of program and majors
- Student etiquette + professional conduct
- Student pictures
- Lunch

Department of Medical Informatics & Clinical Epidemiology (DMICE)

- One of 26 departments in OHSU School of Medicine
- Mission is to provide leadership, discovery, and dissemination of knowledge in the areas of biomedical informatics and clinical epidemiology
  - Fulfilled through programs of research, education, and service
- Department leadership
  - William Hersh, MD - Chair
  - Cynthia Morris, PhD - Vice Chair for Education and Training
  - Joan Ash, PhD - Vice Chair for Faculty Development
  - Shannon McWeeney, PhD, Head, Division of Bioinformatics & Computational Biology
  - David Dorr, MD, MS - Vice Chair for Clinical Informatics
  - Heidi Nelson, MD, MPH - Vice Chair for Clinical Epidemiology

MEDICAL INFORMATICS
& CLINICAL EPIDEMIOLOGY

DMICE is a national leader

- No official rankings, but OHSU informatics program is
  - 1 of 14 programs to have a National Library of Medicine NIH Training Grant for PhD and postdoctoral students
  - 1 of 9 programs funded under the Office of the National Coordinator Health IT Workforce Development Program
  - 1 of 8 programs funded by the NIH Fogarty Center Informatics Training for Global Health Program in collaboration with Hospital Italiano de Buenos Aires
  - Consistent recipient of research funding, appointment to national leadership positions, publication in high-profile journals, etc.
  - Highly accomplished alumni being productive in many different settings
- Clinical epidemiology program also highly successful, especially in areas of evidence-based medicine and comparative effectiveness research

OHSU Biomedical Informatics Graduate Program

- http://www.ohsu.edu/informatics/
- Overall goal of program is to train future professionals, researchers, and leaders in area of biomedical and health informatics
  - Majors focus on different areas of larger field
  - All programs at graduate level, i.e., require a baccalaureate degree
- Diverse students who typically fall into one of two categories
  - "First-career" students more likely to be full-time, on-campus, and from variety of backgrounds
  - "Career-changing" students likely to be part-time, distance, mostly (though not exclusively) from healthcare professions

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Program faculty and leadership

- Overall program director – William Hersh, MD
- Leadership
  - William Hersh, MD – HCIN
  - Shannon McWeeney, PhD – BCB
  - Karen Eden, PhD – PhD program
- Over 30 other faculty who teach, advise, mentor projects, etc.

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Program majors (formerly tracks)

- HCIN
  - Original track/major, focused on informatics and applied data analytics in health, healthcare, public health, and clinical research settings
- BCB
  - Focused on methods and deep analytics applied across omics, imaging, clinical medicine, and public health

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Degrees and certificates

- Doctor of Philosophy (PhD)
  - For those who wish to pursue research, academia, or leadership careers
- Master of Science (MS) thesis
  - Research master's, including for those with doctoral degrees in other fields who wish to pursue research careers
- Master of Science (MS) non-thesis
  - Professional master's degree for practitioners and leaders
- Graduate Certificate
  - Subset of master's degree as an introduction or career specialization (HCIN major only)

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Majors, degrees and certificates, and availability

Degree/Certificate Major	PhD	MS thesis	MS non-thesis	Grad Cert
HCIN	On-campus	On-campus	On-campus On-line	On-campus On-line
BCB	On-campus	On-campus	On-campus	

Curriculum

- Curriculum in each major for degree programs (master's and PhD) organized into domains, each of which may have courses that are
  - Required
  - Individual competency ("k of n")
  - Elective
- Core curriculum of degree programs is knowledge base plus additional courses
  - MS thesis = knowledge base + thesis
  - MS non-thesis = knowledge base + capstone (can be internship)
  - PhD = knowledge base + additional advanced work, including dissertation

Curriculum – organized by domains, each of which have courses

High-Level Competency	Domain Names for HCIN Major	Domain Names for BCB Major
Apply core concepts of using data, information, and knowledge to advance health and biomedicine	Health & Clinical Informatics	Bioinformatics & Computational Biomedicine
Apply knowledge of appropriate area(s) of health and biomedicine to informatics practice and research	Health Care	Biomedical Science
Apply computing skills to biomedical informatics	Computer Science	Computer Science
Apply quantitative methods to biomedical informatics	Evaluative Sciences	Biostatistics
Apply people and organizational knowledge to informatics	Organizational Behavior and Management	N/A
Apply advanced scholarship to biomedical and health informatics	Thesis/Capstone/Dissertation Requirements	Thesis/Capstone/Dissertation Requirements

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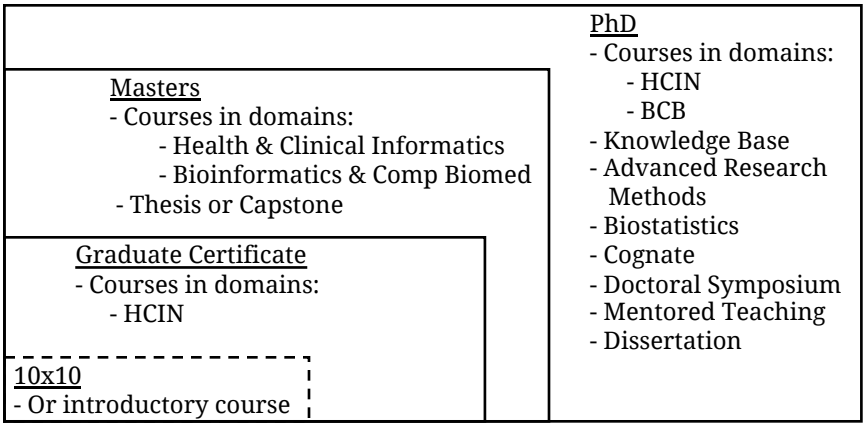
Building block approach



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Other programs

- Fellowships
  - Predoctoral and postdoctoral funding from National Library of Medicine and National Institutes of Health institutes since 1992
  - Clinical informatics fellowship for physician board-certification since 2015
- 10x10 ("ten by ten")
  - Continuing education course in clinical informatics
  - Adaptation of on-line introductory course (BMI 510), with option to pursue further study at OHSU
  - Over 2500 have completed course since 2005, with about 10-15% going on to additional graduate study

AMIA 10x10 Health Informatics Online

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OHSU

OHSU informatics program provides value

- For tuition and fees comparable to other programs, get
  - Cutting-edge curriculum based on solid foundation
  - Faculty who are international leaders in research and practice
  - Internship/practicum experience
  - Career development and advising
  - Connections to industry and others

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OHSU

Alumni – 831 degrees and certificates awarded to 746 people

Degree	Total	BCB	HCIN
Graduate Certificate	455	0	455
Master's (any)	348	46	302
PHD	28	9	19
Total	831	55	776

International students from: Singapore, Thailand, Argentina, Egypt, Israel, Saudi Arabia, Zimbabwe, China, and other countries

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Some job titles and employers

- Product manager
- Data analyst
- Informatics researcher
- Consultant
- Project manager
- Terminology engineer
- Software engineer
- Chief medical informatics officer
- Information systems manager
- Bioinformatician
- Database administrator/architect
- Faculty

- OHSU
- Providence Health System
- Kaiser-Permanente
- OCHIN
- Impact Advisors
- Health Share of Oregon CCO
- Epic
- Cerner
- Intel
- Sutter Health
- National Library of Medicine
- Harvard Medical School
- University of Virginia

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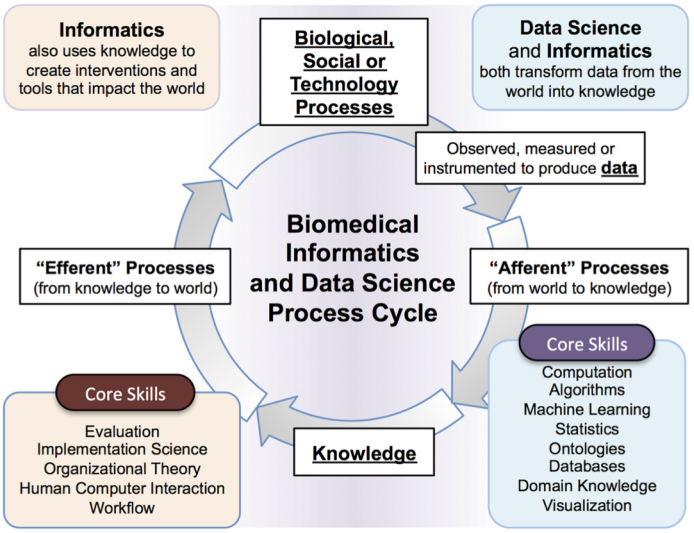
Where does data science fit in? (Payne, 2018)



Health & Clinical Informatics (HCIN) major

- Primary goal of HCIN major is to educate the future developers and managers of health care information systems
- Individuals with a variety of backgrounds are provided a strong technical grounding in clinical informatics, health and medicine, computer science, and research methods so that they may assume positions that require a thorough understanding of both information technology and the health care environment

Domains of HCIN

- Basic principles of **biomedical informatics** to problems in different domains of health and biomedicine
- Basic **computer science** principles to problems in health and biomedicine
- Operational knowledge of the human body in **health and disease** as well as the **organization of the healthcare system**
- Principles of **organizational behavior and management** skills to biomedical informatics problems
- Basic statistics and quantitative or qualitative **research methods** to conduct or evaluative research projects
- Students will be adept in the tools of **advanced scholarship**, including the ability to address ethical issues in the field, communicate effectively in oral and written form, and complete a thesis (MS degree), capstone (MS degree), or dissertation (PhD degree)

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Emerging aspects of HCIN

- Focus shifting from implementing to optimizing HCIN systems
- Applied data science – from "deep divers" to implementers of machine learning, artificial intelligence, etc.
- Professional certification
  - For physicians, subspecialty of clinical informatics
  - Advanced Health Informatics Certification forthcoming from AMIA for others

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A growing understanding of the work of informatics professionals

Health Informatics

Domains	Task statements	KS statements
Domain 1. Foundational Knowledge and Skills	NA	31
Domain 2. Enhancing Health Decision-making, Processes, and Outcomes	11	21
Domain 3. Health Information Systems	26	36
Domain 4. Data Governance, Management, and Analytics	17	28
Domain 5. Leadership, Professionalism, Strategy, and Transformation	20	28
Total	74	144

Clinical Informatics Subspecialty (CIS)

Domains	Task statements	KS statements
Domain 1. Foundational Knowledge and Skills	NA	26
Domain 2. Improving Care Delivery and Outcomes	7	28
Domain 3. Enterprise Information Systems	16	33
Domain 4. Data Governance and Analytics	10	27
Domain 5. Leadership and Professionalism	9	28
Total	42	142

(Silverman, 2019; Gadd, forthcoming)

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Applied health informatics professionals (Gadd, forthcoming)

- Develop, implement, manage and evaluate health information systems
- Manage and analyze data to support decisions related to individual health, population health, and organizational performance
- Strategize, innovate, and envision advancements in health information systems and data analytics
- Lead organizational changes in technology, practice, and culture required for implementation of the envisioned advancements
- Strengthen the practice of health informatics and the health informatics workforce through mentoring, research on best practices, participation in standards development, and/or participation in policy development for advancement of health information systems, health data analytics, and the health informatics workforce

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Domains of clinical informatics practice (Silverman, 2019)

Domain 1: Fundamental Knowledge and Skills

Fundamental knowledge and skills which provide clinical informaticians with a common vocabulary, basic knowledge across all Clinical Informatics domains, and understanding of the environment in which they function.

Domain 2: Improving Care Delivery and Outcomes

Develop, implement, evaluate, monitor, and maintain clinical decision support; analyze existing health processes and identify ways that health data and Health Information Systems can enable improved outcomes; support innovation in the health system through informatics tools and processes.

Domain 3: Enterprise Information Systems

Develop and deploy health information systems that are integrated with existing information technology systems across the continuum of care, including clinical, consumer, and public health domains. Develop, curate, and maintain institutional knowledge repositories while addressing security, privacy, and safety considerations.

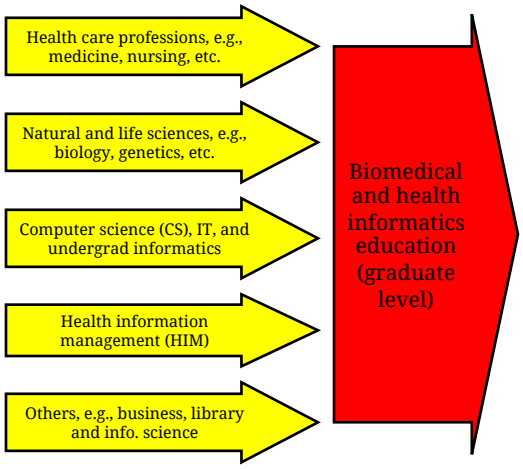
Domain 4: Data Governance and Data Analytics

Establish and maintain data governance structures, policies, and processes. Incorporate information from emerging data sources; acquire, manage, and analyze health-related data to ensure its quality and meaning across settings, and to derive insights to optimize clinical and business decision making.

Domain 5: Leadership and Professionalism

Build support and create alignment for informatics best practices; lead health informatics initiatives and innovation through collaboration and stakeholder engagement across organizations and systems.

HCIN career pathways have diverse inputs and outputs



There is no single career pathway, ladder, etc.

Jobs in:
- Healthcare systems
  - Clinical
  - IT
  - Leadership
- Biomedical research
- Industry
- Academia

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DMICE online

- DMICE seminars
  - YouTube: https://www.youtube.com/channel/UCCekPERb6i3xXEDQxwlCeIA
- Web and blog
  - Web: http://www.ohsu.edu/informatics
  - Blog: http://www.ohsu.edu/blogs/health-data/
- Social media
  - Facebook: https://www.facebook.com/ohsu.informatics
  - Twitter: @OHSUInformatics

Thank You!

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