Open House
Biomedical Informatics Graduate Program
October 8, 2020

Department of Medical Informatics & Clinical Epidemiology
School of Medicine
Oregon Health & Science University
Portland, OR, USA
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30 PM</td>
<td>Welcome and Opening Session</td>
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<tr>
<td></td>
<td>Dr. William Hersh</td>
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<tr>
<td>1:00 PM</td>
<td>Program Sessions:</td>
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<tr>
<td></td>
<td>Health &amp; Clinical Informatics (Dr. William Hersh)</td>
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<tr>
<td></td>
<td>Bioinformatics &amp; Computational Biomedicine (Dr. Ted Laderas)</td>
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<tr>
<td>1:30 PM</td>
<td>Plenary Session:</td>
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<tr>
<td></td>
<td>Alliance for Visible Diversity in Science</td>
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<td></td>
<td>OHSU Center for Diversity and Inclusion</td>
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<td></td>
<td>Career Services</td>
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<tr>
<td>2:15 PM</td>
<td>Student Panel Sessions:</td>
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<tr>
<td></td>
<td>Health &amp; Clinical Informatics</td>
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<tr>
<td></td>
<td>Bioinformatics &amp; Computational Biomedicine</td>
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<tr>
<td>2:45 PM</td>
<td>Admissions Questions</td>
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<td>(Informal session)</td>
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Biomedical Informatics

Overview of Program and Field

William Hersh, MD
Professor and Chair
Department of Medical Informatics & Clinical Epidemiology
School of Medicine
Oregon Health & Science University
Portland, OR, USA
What is biomedical informatics?

• The field concerned with the optimal use of information, often aided by technology, to improve individual health, healthcare, public health, and biomedical research
  – http://informatics.health/

• More about data and information than technology
Important roles for biomedical informatics in 2020 and beyond

• Value of electronic health record (EHR) for improving the quality and safety of healthcare
• Data science, machine learning, and artificial intelligence to maintain health and improve diagnosis and treatment of disease
• Precision medicine to bring “omics” to health and healthcare
• Use of personal health record (PHR), wearables, and other personal information for engaging people in their health and healthcare
• Critical tools in response to COVID-19 pandemic
Many career opportunities

• Recent analysis of healthcare IT workforce shows estimated growth of 19,852-153,114 FTE as EHR adoption increases (Hersh, 2018)
  – https://doi.org/10.1093/jamiaopen/ooyp029

• Largest amount of opportunity in healthcare but plenty of others in research, industry, government, etc.
Emerging and declining jobs in Global Health & Healthcare

Workforce in 2018 and 2022

<table>
<thead>
<tr>
<th>EMERGING</th>
<th>DECLINING</th>
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<tbody>
<tr>
<td>8% in 2018</td>
<td>33% in 2018</td>
</tr>
<tr>
<td>17% in 2022</td>
<td>21% in 2022</td>
</tr>
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</table>

**Emerging Roles such as:**
- Data Analysts and Scientists
- Biologists and Geneticists
- AI and Machine Learning Specialists
- Information Technology Services
- Environmental and Occupational Health and Hygiene Professionals
- Big Data Specialists
- Administrative and Executive Secretaries
- Supply Chain and Logistics Specialists
- Specialist Medical Practitioners

**Declining Roles such as:**
- Data Entry Clerks
- Assembly and Factory Workers
- Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
- Postal Service Clerks
- Electronics and Telecommunications Installers and Repairers
- Client Information and Customer Service Workers
- Business Services and Administration Managers
- Accounting, Bookkeeping and Payroll Clerks
- Accountants and Auditors
- Traditional and Complementary Medicine Professionals
Many areas of biomedical informatics

Informatics = People + Information + Technology

(Hersh, 2009; adapted from Shortliffe, 2006)
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
  – Shannon McWeeney, PhD, Head, Division of Bioinformatics & Computational Biology
  – David Dorr, MD, MS - Vice Chair for Clinical Informatics
  – Karen Eden, PhD - Vice Chair for Faculty Development
  – Cynthia Morris, PhD - Vice Chair for Education and Training
DMICE is a national leader

- No official rankings, but OHSU informatics program is
  - 1 of 16 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 similarly successful in areas of evidence-based medicine, systematic reviews, and meta-analysis
OHSU Biomedical Informatics Graduate Program

- [http://www.ohsu.edu/informatics/](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
Program majors (formerly tracks)

• Health & Clinical Informatics (HCIN)
  – Original track, focused on informatics and applied data analytics in health, healthcare, public health, and clinical research settings

• Bioinformatics & Computational Biomedicine (BCB)
  – Focused on methods and deep analytics applied across omics, imaging, clinical medicine, and public health
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.
One of oldest and largest programs in world – established 1996

Early adopter of online learning, with students across country and world

Have awarded 872 degrees and certificates to 782 people who work in healthcare systems, industry, and other settings

<table>
<thead>
<tr>
<th>Degree</th>
<th>Total</th>
<th>BCB</th>
<th>HCIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cert</td>
<td>467</td>
<td>0</td>
<td>467</td>
</tr>
<tr>
<td>MS</td>
<td>374</td>
<td>54</td>
<td>320</td>
</tr>
<tr>
<td>PhD</td>
<td>31</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>872</td>
<td>65</td>
<td>807</td>
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</table>

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

Despite “age,” continual improvement and updating of curriculum and program
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)
Majors, degrees and certificates, and availability

<table>
<thead>
<tr>
<th>Degree/Certificate Major</th>
<th>PhD Major</th>
<th>MS Thesis</th>
<th>MS non-Thesis</th>
<th>Grad Cert</th>
</tr>
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<tbody>
<tr>
<td>HCIN</td>
<td>On-Campus</td>
<td>On-Campus</td>
<td>On-Campus</td>
<td>On-Campus</td>
</tr>
<tr>
<td>BCB</td>
<td>On-Campus</td>
<td>On-Campus</td>
<td>On-Campus</td>
<td>On-Line</td>
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All “on-campus” programs currently on-line due to COVID-19
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
# Building block approach

<table>
<thead>
<tr>
<th>Masters</th>
<th>PhD</th>
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<tbody>
<tr>
<td>- Courses in domains:</td>
<td>- Courses in domains:</td>
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<tr>
<td>- HCIN</td>
<td>- HCIN</td>
</tr>
<tr>
<td>- BCB</td>
<td>- BCB</td>
</tr>
<tr>
<td>- Thesis or Capstone</td>
<td>- Knowledge Base</td>
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<tr>
<td></td>
<td>- Advanced Research Methods</td>
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<tr>
<td></td>
<td>- Biostatistics</td>
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<td></td>
<td>- Cognate</td>
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<td></td>
<td>- Doctoral Symposium</td>
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<td></td>
<td>- Mentored Teaching</td>
</tr>
<tr>
<td></td>
<td>- Dissertation</td>
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<table>
<thead>
<tr>
<th>Graduate Certificate</th>
<th>10x10</th>
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</thead>
<tbody>
<tr>
<td>- Courses in domains:</td>
<td>- Or introductory course</td>
</tr>
<tr>
<td>- HCIN</td>
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</table>
Informatics career pathways have diverse inputs and outputs.

Health care professions, e.g., medicine, nursing, etc.

Natural and life sciences, e.g., biology, genetics, etc.

Computer science (CS), IT, and undergrad informatics

Health information management (HIM)

Others, e.g., business, library and info. science

There is no single career pathway, ladder, etc.

Jobs in:
- Healthcare systems
  - Clinical
  - IT
  - Leadership
- Biomedical research
- Industry
- Academia
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 started in 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
  – Nearly 2700 have completed course since 2005, with about 10-15% going on to additional graduate study
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
DMICE online

- DMICE seminars
  - YouTube
    - [https://www.youtube.com/channel/UCCekPERb6i3xXEDQxwlCeIA](https://www.youtube.com/channel/UCCekPERb6i3xXEDQxwlCeIA)
- Web and blog
  - Web
    - [http://www.ohsu.edu/informatics](http://www.ohsu.edu/informatics)
  - Blog
    - [http://www.ohsu.edu/blogs/health-data/](http://www.ohsu.edu/blogs/health-data/)
- Social media
  - Twitter
    - [@OHSUInformatics](https://twitter.com/OHSUInformatics)
  - LinkedIn
    - [https://www.linkedin.com/groups/962257/](https://www.linkedin.com/groups/962257/)
  - Facebook
    - [https://www.facebook.com/ohsu.informatics](https://www.facebook.com/ohsu.informatics)
Thank You!

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