Biomedical Informatics: Improving Health, Healthcare, and Biomedical Research with Information Technology

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A bright picture for biomedical informatics in the 21st century

- Recognition of the value of health information technology, including the electronic health record (EHR), for improving the quality and safety of healthcare
- Analytics of EHR and other clinical data for increasing quality, efficiency, and coordination of healthcare
- Use of personal health record (PHR) for engaging consumers and patients in their health and healthcare
- Coming role of genomics and precision medicine, based in part on bioinformatics and computational biology, will revolutionize diagnosis and treatment of disease

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There has been substantial federal investment in health information technology

ARRA
American Recovery and Reinvestment Act of 2009

HITECH
Health Information Technology for Economic & Clinical Health Act

CTSA Clinical & Translational Science Awards®

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NIH Big Data to Knowledge(BD2K)

CNN.com
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updated 7:42 a.m. EST, Mon January 12, 2009

Obama's big idea: Digital health records
President-elect Barack Obama, as part of his effort to revive the economy, is proposing a massive effort to modernize health care by making all health records standardized and electronic. The government estimates about 212,000 jobs could be created by this program, CNNMoney reports. full story

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Faculty with many areas of research expertise

- Re-use of clinical data
    - Predictive analytics – Dorr, Cohen
    - Applying search to EHR data – Hersh, Bedrick, Wu
    - Text and data mining – Cohen
    - Data quality – Weiskopf
- Standards and interoperability – Logan
- Patient shared decision-making – Eden
- People and organizational issues – Ash
- EHR simulation for safety – Gold, Mohan
- Bioinformatics and computational biology – McWeeney and others
- Ontologies – Haendel

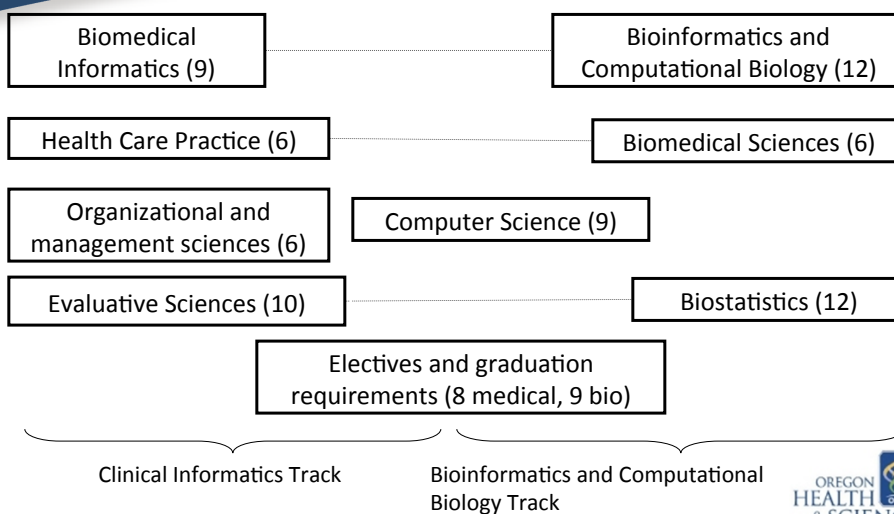OREGON HEALTH & SCIENCE UNIVERSITY

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OHSU is a leader in informatics education

- Overall goal of program is to train future professionals, researchers, and leaders in area of biomedical and health informatics
  - Tracks focus on different areas of larger field
  - All programs at graduate level, i.e., require a baccalaureate degree
- Curriculum centered around "knowledge base"
  - Core knowledge at master's level
  - Two master's degrees – professional and research
  - PhD adds advanced courses and research
- "Building block" approach allows progression to higher levels
- Focused in two main "tracks"
  - Clinical informatics
  - Bioinformatics and computational biology
- http://www.ohsu.edu/informatics-education

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"Knowledge base" and its "domains"

| Biomedical Informatics (9) | Bioinformatics and Computational Biology (12) |

| Health Care Practice (6) | Biomedical Sciences (6) |

| Organizational and management sciences (6) | Computer Science (9) |

| Evaluative Sciences (10) | Biostatistics (12) |

| Electives and graduation requirements (8 medical, 9 bio) |

Clinical Informatics Track   Bioinformatics and Computational Biology Track

By the numbers

Graduates	CI	BCB	HIM	Total
GC	321	0	37	358
MBI	146	6	2	154
MS	68	9	0	77
PhD	10	6	0	16
Total	545	21	39	605

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

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Some job titles and employers

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

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

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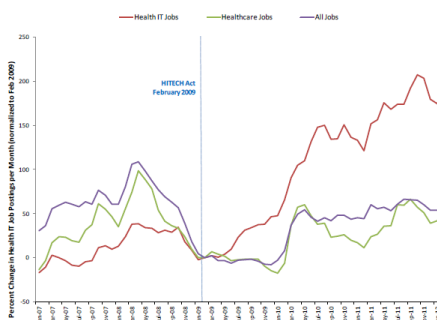
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Emerging aspects of clinical informatics

- Major focus in recent years has been EHR implementation
- Now focus shifting to optimizing clinical systems
  - Latest buzzword: *analytics*
    - In reality, program offers course content in statistics, healthcare quality, clinical data standards, etc.
    - OHSU awarded two education and training grants in area of Big Data Science
- For physicians, new subspecialty of clinical informatics
  - Subspecialty of any primary specialty
  - Additional certification options likely forthcoming for non-physicians

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Excellent job opportunities and salaries

- Percent change in online health IT job postings per month increased much more relative to healthcare jobs and all jobs (Furukawa, 2012)
- Between 2007-2011, 226K health IT jobs posted (Schwartz, 2013)
- Data analytics jobs (not limited to healthcare) estimated to have 150K jobs in core data science and 1.5M jobs managing and using data (Manyika, 2011)

Also opportunities with industry

http://www.ohsu.edu/idl

- Initial major projects
  – First-of-kind partnership with Epic Systems, using EHR for research and education
  – Collaboration with Knight Cardiovascular Institute, helping to develop data analytics capabilities

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