

1.4 Resources – Organizations, Information, Education

What is Biomedical and Health Informatics? - http://informatics.health/ William Hersh Copyright 2025



Resources

- Organizations
- Information
- Education





- American Medical Informatics Association (AMIA)
- Mission
 - AMIA advances the informatics professions relating to health and disease. To this end it advances the use of health information and communications technology in clinical care and clinical research, personal health management, public health/population, and translational science with the ultimate objective of improving health.



Other professional organizations

- <u>Healthcare Information and Management Systems Society (HIMSS)</u>
- American Health Information Management Association (AHIMA)
- <u>Association of Medical Directors of Information Systems (AMDIS)</u>
- <u>Alliance for Nursing Informatics (ANI)</u>
- Public Health Informatics Institute (PHII)
- International Society for Computational Biology (ISCB)
- <u>Society for Imaging Informatics in Medicine (SIIM)</u>
- <u>Association for Computing Machinery (ACM)</u>
- <u>Medical Library Association (MLA)</u>



Medical and nursing specialty societies (nonexhaustive)

- <u>American Medical Association (AMA)</u>
- <u>American Nurses Association (ANA)</u>
- Association of American Medical Colleges (AAMC)
- <u>American College of Physicians (ACP)</u>
- American Academy of Family Physicians (AAFP)



US government agencies

- <u>Department of Health & Human Services (HHS)</u>
 - <u>Assistant Secretary for Technology Policy/Office of the</u> <u>National Coordinator for Health Information Technology</u> (<u>ASTP</u>) – formerly ONC
 - <u>National Institutes of Health (NIH)</u>
 - <u>National Library of Medicine (NLM)</u>
 - <u>Agency for Healthcare Research & Quality (AHRQ)</u>
 - <u>Centers for Disease Control & Prevention (CDC)</u>
 - <u>Food & Drug Administration (FDA)</u>



Where does one find more information? Textbooks

- Hersh W, Ed. (2022). *Health Informatics: Practical Guide*, 8th Edition. Lulu.com <u>Web site</u>
- Shortliffe, EH et al., Eds. (2021). *Biomedical Informatics: Computer Applications in Health Care and Biomedicine, 5th Edition.* Springer
- Finnell JT and Dixon BE, Eds. (2022). *Clinical Informatics Study Guide – Text and Review, 2nd Edition.* Springer



Some other general textbooks

- Rivas, H., Wac, K. (Eds.), 2018. *Digital Health*, Health Informatics. Springer
- Syed-Abdul, S., Zhu, X., Fernandez-Luque, L. (Eds.), 2020. *Digital Health: Mobile and Wearable Devices for Participatory Health Applications*, Elsevier.
- Johnson, K.B., 2021. I'm A Biomedical Informatics Expert Now! Ws Education
- Berner, E.S. (Ed.), 2020. *Informatics Education in Healthcare: Lessons Learned*, 2nd ed, Health Informatics. Springer
- Davis, N.A., 2019. Foundations of Health Information Management E-Book, 5th edition. Elsevier
- Kiel, J.M., Kim, G.R., Ball, M.J. (Eds.), 2022. *Healthcare Information Management Systems: Cases, Strategies, and Solutions*, 5th ed. Springer
- Butler-Henderson, K., Day, K., Gray, K. (Eds.), 2022. *The Health Information Workforce: Current and Future Developments*, 1st ed. Springer
- Meehan, R., Sharp, J., 2023. *Making a Difference*. Productivity Press



Al books

- National Academy of Medicine (Matheny, 2019)
- Deep medicine (Topol, 2019)
- Intelligent systems in medicine and health (Cohen, 2022)
 Including chapter on history of AI in medicine (Shortliffe, 2022)
- Digitizing diagnosis early history of AI (Lea, 2023)
- How data happened (Wiggins, 2023)
- AI in healthcare (Davenport, 2022)
- AI revolution in medicine (Lee, 2023)
- Clinical applications of AI in real-world data (Asselbergs, 2023)
- Translational applications in healthcare (Reddy, 2023)
- Co-intelligence living and working with AI (Mollick, 2024)



More information (cont.), Journals

- Journals of AMIA
 - JAMIA
 - JAMIA Open
- Methods of Information in Medicine (MIM)
- International Journal of Medical Informatics (IJMI)
- Journal of Biomedical Informatics (JBI)
- Applied Clinical Informatics (ACI)
 ACI Open
- Bioinformatics
- Journal of Digital Imaging (JDI)

- Journal of Medical Internet Research (JMIR)
 - JMIR Medical Informatics
 - JMIR AI
- From major journals
 - NEJM AI
 - JAMA + AI
 - BMJ Health & Care Informatics
 - Nature: npj Digital Medicine
- Biomed Central (BMC,)
 - BMC Medical Informatics and Decision Making
 - BMC Bioinformatics



More information (cont.), Meetings

- AMIA meetings
 - Annual Symposium
 - Informatics Summit
 - Clinical Informatics Conference
- Medinfo (biennial)
- Other clinical informatics meetings
 - HIMSS, national meeting and local chapters
 - AMDIS Physician-Computer Connection
- Bioinformatics meetings
 - Pacific Symposium on Biocomputing (PSB)
 - International Society for Computational Biology (ISCB)



More information (cont.), Web sites

- US government
 - <u>HHS ASTP</u>
 - <u>Health IT Playbook</u>
 - <u>ONC HIT curriculum</u>
 - <u>AHRQ Digital Healthcare Research</u>
 - <u>US Health Information Knowledgebase</u>
- Other
 - <u>HealthIT Answers</u>
 - <u>Clinfowiki</u>
 - <u>AMA Introduction to AI in Health Care</u>



More information (cont.), email lists, blogs, podcasts, and social media

- Email lists
 - <u>HISTalk</u>
 - From organizations such as AMIA, HIMSS, AMDIS, etc.
- Blogs
 - <u>Digital Health Frontier</u>
 - <u>Healthcare Standards (Keith Boone)</u>
 - <u>Health IT Buzz (ASTP)</u>
 - <u>Informatics Professor</u>
- Podcasts
 - <u>AMIA</u>
 - For Your Informatics (FYInformatics) from Women in AMIA
 - AMIA Clinical Informatics Fellows (ACIF) Go-Live
 - Kevin Johnson Informatics in the Round
- Social media X/Twitter, LinkedIn, Facebook, BlueSky, etc.



More information (cont.), acronyms

- <u>Health IT Answers</u>
- <u>Shortliffe glossary, which includes acronyms</u>
- <u>Wikipedia</u>



Sampling from the popular press



- Topol, 2012. The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care
- Topol, 2015. The Patient Will See You Now: The Future of Medicine is in Your Hands
- O'Neil, 2016. Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy
- Rosenthal, 2017. An American Sickness: How Healthcare Became Big Business and How You Can Take It Back
- Steele, 2017. ProvenCare: How to Deliver Value-Based Healthcare the Geisinger Way
- Wachter, 2017. The Digital Doctor: Hope, Hype, and Harm at the Dawn of Medicine's Computer Age
- Shapiro, 2018. *Hype: A Doctor's Guide to Medical Myths, Exaggerated Claims, and Bad Advice How to Tell What's Real and What's Not.*
- Zuboff, 2019. The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power
- Miller, 2019. *Lethal Injection*



Sampling from the popular press (cont).

- Robertson, 2020. B C, Before Computers: On Information Technology from Writing to the Age of Digital Data
- Johnson, 2021. I'm A Biomedical Informatics Expert Now!
- Shneiderman, 2022. Human-Centered AI
- Lycette, 2023. *The Algorithm Will See You Now*
- Wiggins, 2023. *How Data Happened: A History from the Age of Reason to the Age of Algorithms*
- Lee, 2023. The AI Revolution in Medicine: GPT-4 and Beyond
- Lea, 2023. Digitizing Diagnosis Medicine, Minds, and Machines in Twentieth-Century America
- Mollick, 2024, *Co-intelligence Living and Working with AI*
- Fox, 2024. Rebel Health: A Field Guide to the Patient-Led Revolution in Medical Care
- Narayanan, 2024, AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference
- Harari, 2024. Nexus: A Brief History of Information Networks from the Stone Age to AI



Education and training in informatics

- Inter-disciplinary field
 - Many programs with diverse curricula
 - Programs come in many flavors: clinical, biomedical, health, bio-, nursing, etc.
- Graduate-level training master's and PhD degrees
 - About 80 master's programs at 76 universities in US (Cox, 2021)
 - Among 6 "highest-paying" master's degrees (Wells, 2024)
- Fellowship programs
 - 18 NLM-funded programs for PhD and postdoc students (Greenes, 2022)
 - Physicians in clinical informatics ACGME accreditation (Patel, 2024)
- Baccalaureate programs
 - Growing number in US; highly variable in scope (McCarthy, 2024)
- Individual courses
 - Introduction to Biomedical Informatics & Artificial Intelligence (10x10, "ten by ten") (Hersh, 2022; Hersh, 2024)



Academic programs

- List of US informatics programs on AMIA Web site
- <u>NLM-funded programs</u> (Greenes, 2022)
- Clinical informatics fellowship programs (Patel, 2024)



Career pathways have diverse inputs and outputs (Hersh, 2009)



There is no single career pathway, ladder, etc.

Healthcare systems
Clinical leadership
IT leadership
Biomedical research

There are many career opportunities in many settings for all tracks



Cardinal rule (formula) of informatics education





Key attributes of OHSU informatics educational program

- Building-block structure
 - Work done at one level can be carried forward to next, i.e.,
 10x10 → Graduate Certificate → MS (thesis or non-thesis)
 → PhD
- Majors
 - Health & Clinical Informatics (HCIN) original program; focused on health and healthcare areas
 - Bioinformatics & Computational Biomedicine (BCB) initial focus on genomics but has expanded to biomedicine



OHSU biomedical informatics core curriculum domains

High-Level Competency	Domain Names for Health & Clinical Informatics (HCIN)	Domain Names for Bioinformatics & Computational Medicine (BCB)	
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	



Application of curriculum to specific programs

- 10x10 program is version of introductory course in clinical informatics track
- Graduate Certificate program focuses mainly on first two domains of HCIN major
 - Biomedical informatics
 - Organizational and management sciences
- Master of Science adds other domains plus either
 - Thesis
 - Capstone or Internship Non-thesis (formerly MBI)
- PhD program adds specialized research training, cognate area of interest, doctoral seminar, and dissertation



Another view of "building block" approach

	<u>PhD</u> - Knowledge Base
- Knowledge Base: - Health & Clinical Informatics - Bioinformatics & Computation Biomedicine - Thesis or Capstone/Internship	 Advanced Research Methods Biostatistics Cognate Advanced Topics Doctoral Symposium
<u>Graduate Certificate</u> - Biomedical Informatics - Organization and management <u>10x10</u>	- Mentored Teaching - Dissertation

http://www.ohsu.edu/informatics-education



Overview of programs available

Degree/Certificate Track	PhD	MS Thesis	MS Non- Thesis	Graduate Certificate
Health & Clinical Informatics (HCIN)	On-campus	On-campus	On-campus On-line	On-campus On-line
Bioinformatics & Computational Biomedicine (BCB)	On-campus	On-campus	On-campus	N/A



OHSU informatics – by the numbers



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

Degree	Total	BCB	HCIN
Grad Cert	499	0	499
MS	444	77	367
PhD	41	18	23
Total	984	95	889





How have OHSU students and graduates done?

- A quarter-century of experience...
- General observation: What people do when they graduate is partially dependent on what they did when they entered, e.g.,
 - Physicians, nurses, public health, etc. draw on their clinical/professional background
 - Information technology professionals draw on their unique background and experience
- Graduates have obtained jobs in a variety of settings, e.g., clinical, academic, and industry
- Some have obtained jobs before finishing the program

