



## AMIA Accreditation Committee

Health Informatics is the interdisciplinary field that studies and pursues the effective uses of biomedical data, information, and knowledge for scientific inquiry, problem solving and decision making, motivated by efforts to improve human health."<sup>1,2</sup>

In recognizing that the application areas range from bioinformatics to clinical and public health informatics, spanning the spectrum from molecular to population levels of health and biomedicine, AMIA described in its white paper a central set of competencies that were shared by many informatics subdisciplines.

In January 2015, AMIA joined the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM) as an Organizational Member. The Health Informatics Accreditation Council (HIAC) was established and initially charged with revising the existing CAHIIM Curriculum Requirements document and the “*Accreditation Standards for Masters’ Degree Programs in Health Informatics.*” The Curriculum Requirements have been reframed as new graduate outcome ‘Health Informatics Competencies’ and will be formally referenced within the curriculum section of the CAHIIM *Accreditation Standards* so as to reflect the emergent knowledge, skills, and attitudes reflecting the foundational domains set forth in 2012 and in so doing, enable their use in the formal accreditation process.

The broadly stated competencies described in the 2012 AMIA White Paper were not yet in a form usable in a formal accreditation process. Through an iterative process of review and revision by the AMIA Accreditation Committee (AAC), there emerged a set of foundational domains with accompanying knowledge, skills, and attitudes necessary to succeed as health informatics professionals or health informaticians.

The newly refined foundational domains with statements of knowledge, skills, and attitudes are intended for curriculum development and accreditation quality assessment for *graduate (Master’s level) education in applied health informatics* as defined by and within the scope set forth by CAHIIM based on the AMIA White Paper of 2012.

Scope of CAHIIM Health Informatics Accreditation<sup>3</sup>:

- *Clinical informatics* is the application of informatics and information technology to deliver healthcare services including medical, nursing, pharmacy and dental informatics.

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<sup>1</sup> Kulikowski CA, Shortliffe EH, Currie LM, Elkin PL, Hunter LE, Johnson TR, Kalet IJ, Lenert LA, Musen MA, Ozbolt JG, Smith JW. AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline. *Journal of the American Medical Informatics Association*. 2012 Nov 1;19(6):931-8.

<sup>2</sup> Fridsma DB. (2016). The scope of health informatics and the Advanced Health Informatics Certification. *Journal of the American Medical Informatics Association*. 2016;23(4):855-856. doi:10.1093/jamia/ocw099

<sup>3</sup> Source: Definitions for each area can be found under the Informatics Areas at the AMIA website [www.amia.org](http://www.amia.org)



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- *Population informatics* is the application of informatics in areas of public health, including surveillance, prevention, preparedness, and health promotion.
- *Consumer health informatics* is the field devoted to informatics from multiple consumer or patient views.
- *Translational bioinformatics* includes the development of storage, analytic, and interpretive methods to optimize the transformation of increasingly voluminous biomedical data, and genomic data, into proactive, predictive, preventive, and participatory health.
- *Clinical research informatics* includes the use of informatics in the discovery and management of new knowledge relating to health and disease and, with translational bioinformatics, are the primary informatics domains to support translational research.



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### Definitions Used:

Competency – “An observable ability of a health professional, integrating multiple components such as knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development.”

Competence – “The array of abilities (KSA) across multiple domains or aspects of performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes with time, experience, and setting.”

Note: KSA acronym for Knowledge, Skills, and Attitudes

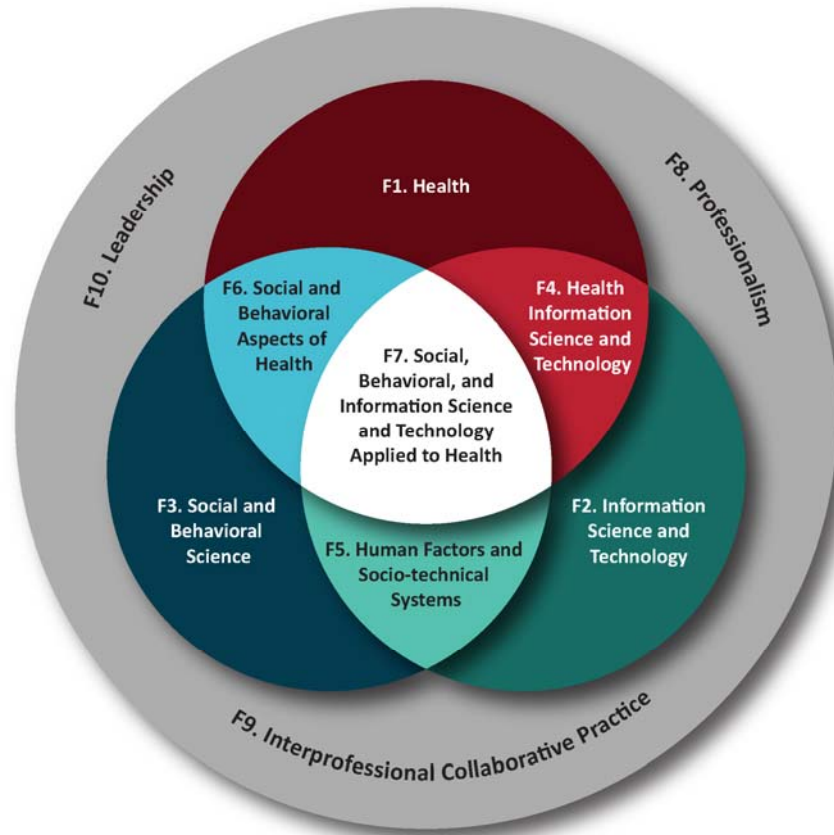
Source: Frank, J. R., Snell, L. S., Cate, O. T., Holmboe, E. S., Carraccio, C., Swing, S. R., ... & Harris, K. A. (2010). Competency-based medical education: theory to practice. *Medical Teacher*, 32(8), 638-645.

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Application area – As described in the AMIA 2012 White Paper, application areas of health informatics range from bioinformatics to clinical and public health informatics, spanning the spectrum from molecular to population levels of health and biomedicine.

Source: Kulikowski CA, Shortliffe EH, Currie LM, Elkin PL, Hunter LE, Johnson TR, Kalet IJ, Lenert LA, Musen MA, Ozbolt JG, Smith JW. AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline. *Journal of the American Medical Informatics Association*. 2012 Nov 1;19(6):931-8.

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### Foundational Domains:

The discipline of health informatics exists at the confluence of three major domains: *Health, Information Science and Technology, and Social and Behavioral Science*. Graduate students in this discipline are expected to have *working knowledge* of these three domains as these domains define and affect the practice of health informatics. Where two domains of knowledge intermingle, each affects the other, and the graduate student is expected to demonstrate the *knowledge, skills, and attitudes* that exist in these co-mingled domains: *Health Information Science and Technology, Human Factors and Socio-technical Systems, and Social and Behavioral Aspects of Health*. Where all three domains intermingle, the graduate student is expected to demonstrate the *knowledge, skills, and attitudes* that exist in this most complex domain: *Social, Behavioral, and Information Science and Technology Applied to Health*. As with all other health professions, the work of health informaticians affects the health, safety, and effectiveness of those working and being cared for within the system of health care delivery. Graduate students are expected to demonstrate the *knowledge, skills, and attitudes* reflecting the domains of *Professionalism, Interprofessional Collaborative Practice, and Leadership*.

Graphic: Christina Lorenzo, Candidate, MS in Biomedical Visualization, Department of Biomedical and Health Information Sciences, University of Illinois at Chicago



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### F1 Health

Health refers to the biomedical and health sciences underlying AMIA's five major informatics areas: translational bioinformatics, clinical research informatics, clinical informatics, consumer health informatics, and population informatics. The biomedical and health sciences aim to understand and improve human health. To identify and develop solutions to biomedical informatics problems, students must understand the history, goals, methods (including data and information used and produced), and current challenges of the major health sciences including human biology, genomics, clinical and translational science, healthcare delivery, personal health, and population health.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to...*

Describe the history, goals, methods (including data and information used and produced), and current challenges of the major health science fields. These include biology, genomics, clinical and translational science, healthcare delivery, personal health, and population health.



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### **F2** Information Science and Technology

Information Science and Technology refers to the key concepts, methods, and tools for creating, acquiring, storing, representing, accessing, merging, organizing, processing, transferring, analyzing, reporting, and visualizing data, information, and knowledge. It also includes the methods and tools for protection of the data, information, and knowledge from unauthorized access. Included are understanding how information is used and the ability to assess the information needs of users. Familiarity is required with basic computer science terminology and concepts including terms and concepts related to information systems and computer programming, information retrieval, ontologies, business intelligence, analytics, and user interface design.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to...*

Identify the applicable information science and technology concepts, methods, and tools, which may be dependent upon the application area of the training program, to solve health informatics problems. These include the concepts, methods, and tools related to managing data, information, and knowledge, the basic information and computer science terms and concepts, the principles of information security, as well as the methods of assessing users' information needs.



## AMIA Accreditation Committee



F3

### Social and Behavioral Science

Social and Behavioral Science refers to basic social, behavioral, psychological, and management theories, methods, and models as well as the legal and regulatory frameworks that seek to describe human actions and interactions as well as human behavior in society. It includes concepts from the fields such as sociology, economics, anthropology, political science, law, psychology, and management and cognitive sciences. It is concerned with the application of social, behavioral, psychological, and management theories, methods, and models to the design, implementation, and evaluation of health information behaviors at the levels of individual, social group, organizations, and society, which are influenced by laws and regulations. The purpose is to contribute to decreasing health damaging behaviors and improving health promoting behaviors and psychosocial well-being through health informatics perspectives.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Identify the effects of social, behavioral, legal, psychological, management, cognitive, and economic theories, methods, and models applicable to health informatics from multiple levels including individual, social group, and society.



## AMIA Accreditation Committee



F4

### Health Information Science and Technology

Health Information Science and Technology refers to the array of health information science and technology methods, tools, and standards for collecting, organizing, representing, sharing, integrating, using, governing and learning from biomedical and health data, information, and knowledge, across the entire spectrum of informatics domains. Systems design and development addresses standards, integration, interoperability, and protection of information. These competencies also address computational thinking, which includes problem solving, systems design, and understanding human behavior, as associated with computer science.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Identify possible biomedical and health information science and technology methods and tools for solving a specific biomedical and health information problem. Core health information technology tools may be dependent upon the application area of the training program.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Design a solution to a biomedical or health information problem by applying computational and systems thinking, information science, and technology.

#### Attitudes/abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Demonstrate consideration of the advantages and limitations of using information science and technology to solve biomedical and health information problems as well as the needs of the different stakeholders and context.





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F5

### Human Factors and Socio-technical Systems

Human Factors and Socio-technical Systems refers to the interactions between human behaviors (physical, social, cognitive, and psychological) and information technologies. People and organizations are the ultimate users of health information and technologies. This domain draws on the social, behavioral, cognitive, economic, human factors engineering, and management and systems sciences in considering the needs, workflows, and practices of individuals and organizations in the context of information systems and technology.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Draw on socio-technical knowledge regarding the social behavioral sciences and human factors engineering to apply to the design and implementation of information systems and technology.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Apply social behavioral theories and human factors engineering to the design and evaluation of information systems and technology.

#### Attitudes/abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Demonstrate consideration and respect for the role of users in the design and application of information systems and technology.



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F6

### Social and Behavioral Aspects of Health

Social and Behavioral Aspects of Health refers to action(s) taken by an individual, groups of individuals, or an organization to manage the health of an individual or population. It entails social determinants and patient-generated data, analyses of problems arising from health or disease, the implications of these problems on daily activities, and the practical solutions to managing these problems. Patient behavior (that may be affected by genotypes and phenotypes), health literacy, informed decision making, patient engagement, and patient activation are examples of issues in this domain. Other common topics in this domain, depending on the program focus, may include health-behavioral paradigms such as health and healthcare self-management, substance abuse, utilization of healthcare services, characteristics of nutrition, exercise/physical activity habits, organizational network analyses, precision medicine and individualized care, etc.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Identify theories or models that explain and modify patient or population behaviors related to health and health outcome.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Apply models, which may be dependent upon the application area of the training program, to address social and behavioral problems related to health of individuals, populations, and organizations.

#### Attitudes/abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Acknowledge the importance of social and behavioral aspects of health and their contribution to the health of individuals and populations.



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F7

### **Social, Behavioral, and Information Science and Technology Applied to Health**

Social, Behavioral, and Information Science and Technology Applied to Health refers to the integration of social, business, human factors, behavioral, and information sciences and technology on the design, implementation, and evaluation of health informatics solutions. The application of health technologies and clinical and/or business processes can impact individual and community health outcomes at numerous levels from molecular and biological systems, to healthcare and organizational protocols, to social systems and population health.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Identify the theories, models, and tools from social, business, human factors, behavioral, and information sciences and technologies for designing, implementing, and evaluating health informatics solutions. Theories, models, and tools may be dependent upon the application area of the training program.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Integrate and apply the theories, models, and tools from social, business, human factors, behavioral, and information sciences and technologies to design, implement, and evaluate health informatics solutions. Theories, models, and tools may be dependent upon the application area of the training program.

#### Attitudes/abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Demonstrate an awareness of the interrelatedness of social, business, human factors, behavioral, and information sciences and technology in the design, implementation, and evaluation of health informatics solutions.



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F8

### Professionalism

Professionalism refers to the level of excellence or competence that is expected of a health informatics professional and includes such concepts as the maintenance and utilization of knowledge and technical skills, which may be dependent upon the application area of the training program; commitment to professional ethical principles including those in AMIA's Code of Ethics; and maintenance of the highest standards of excellence in the field including professional development. In health informatics, there is a particular emphasis on preserving the confidentiality, privacy, and security of patient and other health data and information, and balancing it with appropriate stakeholder access.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Define and discuss ethical principles and the informatician's responsibility to the profession, their employers, and ultimately to the stakeholders of the informatics solutions they create and maintain.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Demonstrate professional practices that incorporate ethical principles and values of the discipline.

#### Attitudes/abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Demonstrate awareness of the value of information literacy and lifelong learning, maintenance of skills, and professional excellence.



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F9

### Interprofessional Collaborative Practice

Interprofessional Collaborative Practice (ICP) refers to the shared, coordinated work among peers from different professions in order to achieve a common goal or mission. The work may range from local projects to those on a national and international scale, and should be performed in an ethical manner that involves honesty, integrity, trust, and respect. Part of this domain is teamwork and team science, which involves drawing on individual team members' strengths and expertise and assigning designated roles and methods to achieve the goals and mission. ICP requires effective communication skills. In summary, the domain requires mastery of values/ethics, roles/responsibilities, interprofessional communication, and team/teamwork.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to...*

Define and discuss the scope of practice and roles of different health professionals and stakeholders including patients, as well as the principles of team science and team dynamics to solve complex health and health information problems.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to...*

Apply relationship-building skills and the principles of interprofessional communication in a responsive and responsible manner that supports a team approach to solve complex health and health information problems.

#### Attitude/Abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to...*

Recognize the importance of mutual respect and shared values, as well as one's own role, the role of other professions and stakeholders including patients, and the role of teamwork and team science to solve complex health and health information problems.



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F10

### Leadership

Leadership refers to the interactive process for which the output is vision, guidance, and direction. Essentials of leadership include vision, communication skills, stewardship, acting as a change agent, and the developing and renewing of followers and future leaders. Leaders must envision goals, set priorities, manage change, make decisions, communicate, serve as a symbol of one who is willing to take risks and has credible expertise, and guide others by motivating other leaders as well as those who will follow. The concept of followership refers to a role held by certain individuals in an organization, team, or group. Specifically, it is the capacity of an individual to actively follow a leader. For leaders to be successful at leadership, they must possess the following characteristics: credibility, honesty, competence, ability to inspire, and the ability to formulate and communicate a vision.

#### Knowledge

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Articulate the methods, concepts, tools, and characteristics of leading and leadership.

#### Skills

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Employ leadership and followership methods, concepts, and tools to motivate others toward accomplishing a health informatics vision.

#### Attitude/Abilities

*At the time of graduation from an applied master of science in health informatics program, the graduate student should be able to....*

Demonstrate leadership behaviors for achieving a vision for health informatics solutions.



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## AMIA Accreditation Committee Roster

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