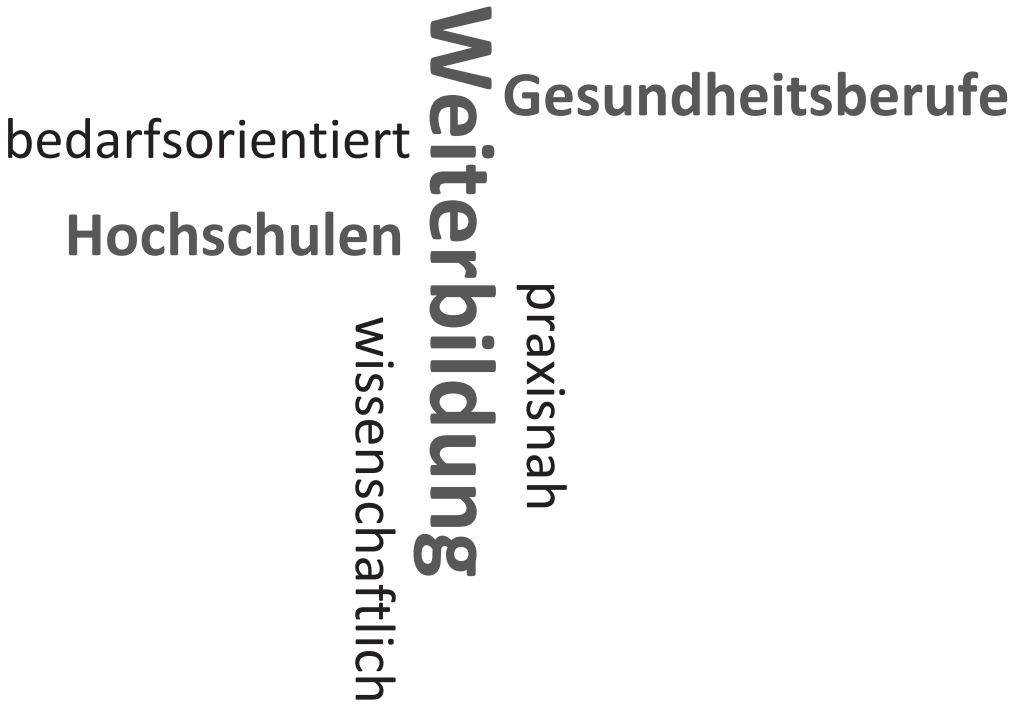
KeGL | Kompetenzentwicklung von Gesundheitsfachpersonal im Kontext des Lebenslangen Lernens

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES



Forschungsergebnisse

Kompetenzpassung und Ermittlung von Bedarfen für die Kompetenzentwicklung bei Gesundheits- und Medizininformatiker/innen (KeGMI)

Bedarfsanalysen

Nicole Egbert, Jan-David Liebe, Georg Schulte, Johannes Thye und Ursula Hübner

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Diese Publikation wurde im , Kompetenzpassung und Ermittlung von Bedarfen für die Kompetenzentwicklung von Gesundheits- und Medizininformatiker/innen (KeGMI) ‘ der Hochschule Osnabrück innerhalb des niedersächsischen Verbundvorhabens ‚Kompetenzentwicklung von Gesundheitsfachpersonal im Kontext des Lebenslangen Lernens (KeGL)‘ erarbeitet. Folgende Hochschulpartner sind an dem Verbund beteiligt:

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1 Australian Health Informatics Education Council – Health Informatics Scope, Careers and Competencies

This document defines the scope of Health Informatics, identifies areas of Health Informatics specialisation, roles and career options, defines Health Informatics competencies, and identifies the Health Informatics skill sets required by people working in the healthcare industry.

Rollen

There are two general skill domains:

- Health and Aged Care Professionals – the skills needed in an eHealth enabled healthcare environment, and
- Health Informatics general and specialist roles – the specific skills needed to create, operate in, manage and maintain the Health Informatics domain.

Examples of Health and Aged Care Professionals requiring base skills in technology, healthcare and administration (to equip them to work in eHealth enabled environments) include:

- Clinicians and aides in medical, nursing, allied and complementary health professions
- Service managers and business administrators in public, private and not-for-profit healthcare organisations
- Planners and policy-makers, researchers and educators in the health sector
- Other people working in health, ageing and related services, including administrative support.

These people need to know how to use, make decisions about and relate to ICT, clinical information and processes, and healthcare governance and administrative processes to effectively and efficiently apply that knowledge in their role.

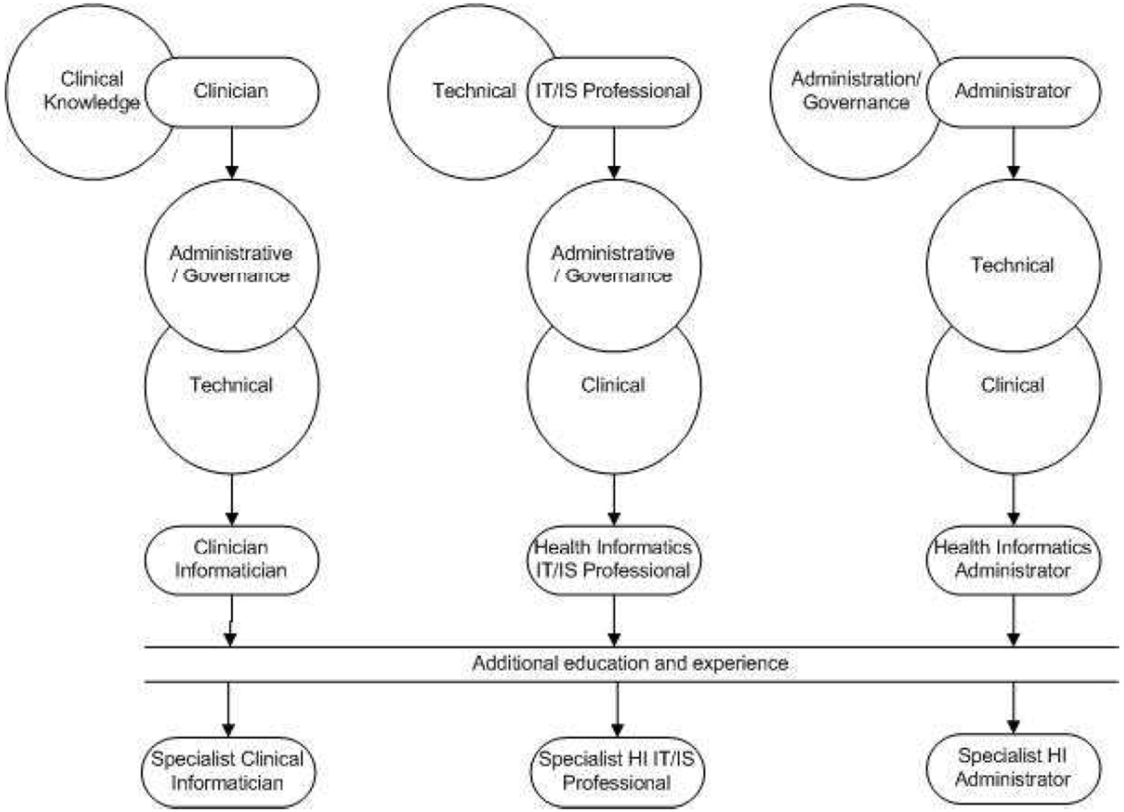
Examples of Health Informatics roles, based upon common knowledge groups or specialisations identified by IMIA include:

HI Specialisation	**Description**
Health Informatician	A person with general Health Informatics knowledge and skills
IT Health Informatician	A person with a technology focus of Health Informatics knowledge and skills
IS Health Informatician	A person with an information systems focus of Health Informatics knowledge and skills
Biomedical Informatician	A person with biological/medical focus of informatics knowledge and skills
Clinical Informatician	A person with a medical, nursing or allied health education focus of Health Informatics knowledge and skills
Health Information Manager	A person with specialist health information management knowledge and skills
Clinical Terminologist	A person with specialist clinical terminology knowledge and skills
Health Informatics Administrator	A person who is a specialist in administrating processes associated with the adoption and use of health information technologies

Health Informatics Educator	A person with general Health Informatics and education knowledge and skills

Karrierepfade

IMIA have recognised that a person who begins in one area of qualification as an undergraduate can often lead to specialisation in another area through further study, and that some people may seek university based education to prepare for careers as Health Informatics specialists. Health Informatics includes people from a broad range of original qualifications and areas of practice and offers opportunities for those from many professional backgrounds to advance into more complex Health Informatics specialty areas. The following Figure illustrates generic career pathways in Health Informatics. This diagram shows the three domains of Health Informatics (Technical, Clinical and Administrative) in the context of the key domain strength of the entry level educated professional and the additional knowledge and skills required to appropriately and effectively practice in Health Informatics.



Kompetenzentwicklung
Short term up-skilling may occur through professional and industry organisations and the vocational sector. Addressing longer term workforce impacts requires higher education programs which can develop the entry level health workforce and post graduate programs to support skill extension and career change.

There are effectively four streams to the development of skills in our community:

- School leavers – development of the existing health professionals (largely through higher education)
- Existing workforce – up-skilling to meet the requirements of today's healthcare
- Existing workforce seeking to extend into another discipline
- Development of combined degrees (e.g. medical and information systems)

	Fachkompetenz		**Personale Kompetenz**	
	Wissen	**Fertigkeiten**	**Sozialkompetenz**	**Selbständigkeit**
Basis (Voraussetzungen)	• ICT literacy, technology • Health Informatics requires knowledge in technical (Information and Communication Technology - ICT), clinical and administrative (including governance and business) domains as they relate to healthcare. • Evolution of informatics as a discipline and as a profession • Need for systematic information processing in healthcare, benefits and constraints of information technology in healthcare • Characteristics, functionalities and examples of information systems in healthcare (e.g. clinical information systems, primary care information systems) • Characteristics, functionalities and examples of information systems to support patients and the public (e.g. patient-oriented information system architectures and applications, personal health records) • Basic informatics terminology, including data, information, knowledge, hardware, software, computer networks, information systems, information systems management • Fundamentals of human functioning and biosciences • Fundamentals of what constitutes health, from physiological, sociological, psychological, nutritional, emotional, environmental, cultural, spiritual perspectives and its assessment	• Written and oral communication • Presentation of information • Problem solving • Planning and organizing • Use of personal application software for documentation and communication including internet for access to publications and basic statistics • Ability to use personal computers, text processing and spreadsheet software, easy to use database management systems • Ability to communicate electronically, including electronic data exchange, with other health care professionals, internet/intranet use	• Interpersonal communication • Teamwork • Ethical behaviour • Social responsibility	• Continual professional development, self-management and life-long learning • Initiative and enterprise skills
Bachelor (Praxis)	• Architectures of information systems in healthcare: approaches and standards for communication and cooperation and for in-	• Efficient and responsible use of information processing tools, to		

	terfacing and integration of component, architectural paradigms (e.g. service oriented architectures) • Methods and approaches to regional networking and shared care (eHealth, health telematics applications and interorganisational information exchange) • Structure, design and analysis principles of the health record including notions of data quality, minimum data sets, architecture and general applications of the electronic health record (all types) • Socio-material and socio-technical issues, including workflow/process modelling and reorganisation • Principles of data representation and data analysis using primary and secondary data sources, principles of data mining, data warehouses, knowledge management • Ethical and security issues including accountability of health care providers and managers and Health Informatics specialists and the privacy, and security of patient data • Nomenclatures, vocabularies, terminologies, ontologies and taxonomies in health care • Classification and casemix • Principles of clinical decision making and diagnostic and therapeutic strategies • Policy and regulatory frameworks for information handling in healthcare • Principles of evidence-based clinical practice • Health administration, health economics, health quality management and resource management, patient safety initiatives, public health services and outcome measurement • Health Terminology development • Identity management in healthcare, including collection and data quality management for identifiers in a shared healthcare environment • Methods of theoretical informatics/computer science e.g. complexity theory, encryption/security • Methods of technical informatics/computer science, e.g. network architectures and topologies, telecommunications, wireless technology, virtual reality, multimedia • Methods of interfacing and integration of information system	support health care practice and decision making • Appropriate documentation and health data management principles including ability to use health and medical coding systems, construction of health and medical coding systems • Informatics methods and tools to support education (including flexible and distance learning), use of relevant educational technologies, including internet and world wide web		

	components in healthcare, interfacing standards, dealing with multiple patient identifiers, including HL7 • Information system lifecycle: analysis, requirement specification, implementation and /or selection of information systems, risk management, user training • Methods of project management and change management (i.e. project planning, resource management, team management, conflict management, collaboration and motivation, change theories, change strategies) • Mathematics: algebra, analysis, logic, numerical mathematics, probability theory and statistics, cryptography • Methods for decision support and their application to patient management, acquisition, representation and engineering of medical knowledge; construction and use of clinical pathways and guidelines • Basic concepts and applications of ubiquitous computing (e.g. pervasive, sensor-based and ambient technologies in healthcare, health enabling technologies, ubiquitous health systems and ambient assisted-living) • Usability engineering, human-computer interaction, usability evaluation, cognitive aspects of information processing			
Master / Dissertation (Forschung und Leitungsposition)	• Biomedical modelling and simulation. Biometry and epidemiology including study design • Methods of practical informatics/computer science, including programming languages, software engineering, data structures, database management systems, information and system modelling tools, information systems theory and practice, knowledge engineering, (concept) representation and acquisition, software architectures	• Evaluation and assessment of information systems, including study design, selection and triangulation of (quantitative and qualitative) methods, outcome and impact evolution, economic evaluation, unintended consequences, systematic reviews and metaanalysis		

Quelle: Australian Health Informatics Education Council (AHIEC), Health Informatics Scope, Careers and Competencies Version 1.9., Australian Health Informatics Education Council, 2011, available from http://www.ahiec.org.au/docs/AHIEC_HI_Scope_Careers_and_Competencies_V1-9.pdf.

2 AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline

The AMIA biomedical informatics (BMI) core competencies have been designed to support and guide graduate education in BMI, the core scientific discipline underlying the breadth of the field's research, practice, and education.

The AMIA BMI analysis highlights the central shared set of competencies that should guide curriculum design and that graduate students should be expected to master.

This work is primarily intended to assist AMIA and informatics training programs as they track and guide the evolution of core BMI competencies for the field of BMI in general, especially at graduate levels of training (masters and doctoral levels).

Definition:
Biomedical informatics (BMI) 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, driven by efforts to improve human health.

- Scope and breadth of discipline: BMI investigates and supports reasoning, modelling, simulation, experimentation, and translation across the spectrum from molecules to individuals and to populations, from biological to social systems, bridging basic and clinical research and practice and the healthcare enterprise.
- Theory and methodology: BMI develops, studies, and applies theories, methods, and processes for the generation, storage, retrieval, use, management, and sharing of biomedical data, information, and knowledge.
- Technological approach: BMI builds on and contributes to computer, telecommunication, and information sciences and technologies, emphasizing their application in biomedicine.
- Human and social context: BMI, recognizing that people are the ultimate users of biomedical information, draws upon the social and behavioural sciences to inform the design and evaluation of technical solutions, policies, and the evolution of economic, ethical, social, educational, and organizational systems.

A critical function of a good graduate program is to identify foundational components that are essential for a student with one major type of background so that the core competencies can best be personalized to their needs and career goals.

For example, a graduate student with a primary background in the biological sciences and a medical, dental, or nursing degree will need to be taught about the distinctions between syntactic and semantic representations and about cognitive, social, and pragmatic theories as they are used in BMI much more so than would be the case for a student with a primary background in the mathematical and computational sciences (who is more likely already to know about these concepts and distinctions). Similarly, an incoming student with technical computing skills will instead have to learn much more about typologies of biomedical data, information, and knowledge, with which the biomedical student will already be familiar. Students of both backgrounds will need to learn about

knowledge representations and frameworks for modelling in the context of practical problems, such as the analysis of genomic or clinical datasets, or the integration of signal and imaging data with patient electronic health record (EHR) data.

	Fachkompetenz		Personale Kompetenz	
	Wissen	**Fertigkeiten**	**Sozialkompetenz**	**Selbständigkeit**
Basis (Voraussetzungen)			• Work collaboratively: Team effectively with partners within and across disciplines	
Bachelor (Praxis)	• Prerequisite knowledge and skills: Students must be familiar with biological, biomedical, and population health concepts and problems including common research problems. • Fundamental knowledge: Understand the fundamentals of the field in the context of the effective use of biomedical data, information, and knowledge. For example: Biology: molecule, sequence, protein, structure, function...; Translational and clinical research: genotype, phenotype, pathways, mechanisms, evidence, evaluation...; Healthcare: screening, diagnosis), treatment, prevention, billing, error reduction, medical records, personalized medicine, health economics, information security and privacy...; Personal health: patient, consumer, provider, personal health records...; Population health: detection, prevention, screening, education... • Theories: Understand and apply syntactic, semantic, cognitive, social, and pragmatic theories as they are used in biomedical informatics. • Typology: Understand, and analyse the types and nature of biomedical data, information, and knowledge. • Frameworks: Understand, and apply the common conceptual frameworks that are	• Acquire professional perspective: Understand and analyse the history and values of the discipline and its relationship to other fields while demonstrating an ability to read, interpret, and critique the core literature • The effective uses of biomedical data, information, and knowledge for scientific inquiry, problem solving and decision making, motivated by efforts to improve human health • Analyse problems: Analyse, understand, abstract, and model specific biomedical problem in terms of data, information, and knowledge components • Produce solutions: Use the problem analysis to identify and understand the space of possible solutions and generate designs that capture essential aspects of solutions and their components • Articulate the rationale: Defend the specific solution and its advantage over competing options • Implement, evaluate, and refine: Carry out the solution (including obtaining necessary resources and managing projects), evaluate it, and iteratively improve it • Procedural knowledge and skills: For substantive problems related to scientific inquiry, problem solving, and decision making, apply, analyse, evaluate, and create solutions based on biomedical informatics approaches.	• Educate, disseminate, and discuss: Communicate effectively to students and to other audiences in multiple disciplines in persuasive written and oral form • BMI graduates know about the boundaries of individual and group responsibility and know how to interact with a wide range of stakeholders	

	used in biomedical informatics. A framework is a modelling approach (e.g., belief networks), programming approach (e.g., object-oriented programming), representational scheme (e.g., problem space models), or an architectural design (e.g., web services). • Prerequisite knowledge and skills: Assumes familiarity with data structures, algorithms, programming, mathematics, statistics • Fundamental knowledge: Understand and apply technological approaches in the context of biomedical problems. For example: Imaging and signal analysis, Information documentation, storage, and retrieva, Machine learning, including data mining, Networking, security, databases, Natural language processing, semantic technologies, Representation of logical and probabilistic knowledge and reasoning, Simulation and modelling, Software engineering. • Prerequisite knowledge and skills: Familiarity with fundamentals of social, organizational, cognitive, and decision sciences • Fundamental knowledge: Design: for example, human-centred design, usability, human factors, cognitive and ergonomic sciences and engineering. • Fundamental knowledge: Social, behavioural, communication, and organizational sciences: for example, computer supported cooperative work, social networks, change management, human factors engineering, cognitive task analysis, project management. • Fundamental knowledge: Ethical, legal, social issues: for example, human subjects, HIPAA, informed consent, secondary use of data, confidentiality, and privacy. • Fundamental knowledge: Economic, social and organizational context of biomedical re-	• Understand and analyse complex biomedical informatics problems in terms of data, information, and knowledge. • Apply, analyse, evaluate, and create biomedical informatics methods that solve substantive problems within and across biomedical domains. • Relate such knowledge and methods to other problems within and across levels of the biomedical spectrum. • Knowledge representation: Understand and apply representations and models that are applicable to biomedical data, information, and knowledge. • Methods and processes: Understand and apply existing methods (e.g., simulated annealing) and processes (e.g., goal oriented reasoning) used in different contexts of biomedical informatics. • Procedural knowledge and skills: For substantive problems, understand and apply methods of inquiry and criteria for selecting and utilizing algorithms, techniques, and methods: Describe what is known about the application of the fundamentals within biomedicine. Identify the relevant existing approaches for a specific biomedical problem. Apply, adapt, and validate an existing approach to a specific biomedical problem. • Analyse complex biomedical informatics problems in terms of people, organizations, and socio-technical systems. • Understand the challenges and limitations of technological solutions. • Design and implement systems approaches to biomedical informatics applications and interventions. • Evaluate the impact of biomedical informatics applications and interventions in terms of people, organizations, and sociotechnical systems. • Relate solutions to other problems within and		

	search, pharmaceutical and biotechnology industries, medical instrumentation, healthcare, and public health.	across levels of the biomedical spectrum.		
Master / Dissertation (Forschung und Leitungsposition)	• Fundamental knowledge: Evaluation: for example, study design, controlled trials, observational studies, hypothesis testing, ethnographic methods, field observational methods, qualitative methods, mixed methods.	• Innovate: Create new theories, typologies, frameworks, representations, methods, and processes to address biomedical informatics problems		

Quelle: C.A. Kulikowski, E.H. Shortliffe, L.M. Currie, P.L. Elkin, L.E. Hunter, T.R. Johnson, I.J. Kalet, L.A. Lenert, M.A. Musen, J.G. Ozbolt, J.W. Smith, P.Z. Tarczy-Hornoch and J.J. Williamson, AMIA Board white paper: definition of biomedical informatics and specification of core competencies for graduate education in the discipline, J Am Med Inform Assoc 19(6) (2012), 931-938.

3 Health Informatics Professional CORE COMPETENCIES – COACH

COACH: Canada's Health Informatics Association is the voice of health informatics (HI) in Canada, promoting the adoption, practice and professionalism of HI. COACH represents a diverse community of accomplished, influential professionals who work passionately to make difference in advancing healthcare through information technology. HI is the intersection of clinical, IM/IT and management practices. Members are dedicated to realizing their full potential as professionals and advancing HI through access to information, talent, credentials, recognition, programs and a broad range of services and specialized resources.

The Health Informatics Professional Core Competencies sets out a common core or shared set of skills, knowledge, attitudes, and capabilities necessary for each of us to effectively perform as a Health Informatics Professional, regardless of the route by which each of us originally entered the field of HI, or our current of area of practice within the diverse field of HI.

Core Competencies was originally released in November 2007, providing a key foundational element for COACH's Health Informatics Professionalism Program. Version 3.0, released in November 2012, is the first major revision of the competencies themselves since 2007, and reflects COACH's commitment to ensuring that health informatics practices continue to advance in enabling continuous health system improvement.

Definition of Health Informatics:
HI involves the application of information technology to facilitate the creation and use of health-related data, information and knowledge. HI enables and supports all aspects of safe, efficient and effective health services. HI applications include the design, development, implementation, maintenance and evaluation of:

- Communication protocols for the secure transmission of healthcare data
- Electronic patient record systems (regionally, provincially, territorially or nationally)
- Evidence-based clinical decision support systems
- Classification systems using standardized terminology and coding
- Case management systems (e.g., for community, home and long-term care)
- Access and referral systems for healthcare services
- Patient monitoring systems (e.g., computer controlled bedside monitors and patient home monitoring devices)
- Digital imaging and image processing systems
- Telehealth technologies to facilitate and support remote diagnosis and treatment
- Internet and mobile technology and applications for engaging patients in their own care
- Public health surveillance and protection systems
- Methodologies and applications for data analysis, management and mining
- Clinical information data warehouses and reporting system
- Business, financial, support and logistic systems

	Fachkompetenz		Personale Kompetenz	
	Wissen	**Fertigkeiten**	**Sozialkompetenz**	**Selbständigkeit**
Basis (Voraussetzungen)				
Bachelor (Praxis)	• Management of information as a key strategic resource • Understanding of the key attributes of data and information (e.g., quality, integrity, accuracy timeliness, appropriateness) and their limitations within the context of intended use (e.g., clinical and analytical uses) • Understanding of the data interrelationships and dependencies among the various health information systems (e.g., decision support systems, electronic health records, order entry, registries, etc.) • Understanding of the implications of ethical, legislative, and regulatory requirements related to the management of health information • Policies, principles and guidelines for the management of health information • Understanding of relevant health information standards and their appropriate use (e.g., classifications, vocabularies, nomenclature, etc.) • Data quality principles and methodologies into the identification use and management of information sources (people and systems) • Understanding of key information technology concepts and components (e.g., networks, storage devices, operating systems, information retrieval, data warehousing, applications, firewalls, etc.) • Stakeholder management • Health informatics standards and enterprise models to enable system interoperability (e.g., terminology, data structure, system to system communication, privacy, security, safety) • Knowledge of health data, information and	• Apply ethical principles to the collection, maintenance, use and dissemination of data and information • Promote and incorporate standardization and consistency with respect to how information is captured, reported and exchanged • Provide and use information to enable sound decision making • Possess a blend of education and experience having: graduated from a recognized program in one of the source disciplines and garnered the other requisite core competencies through work experience and self-study in the HI field and/or graduated from a multi-disciplinary HI program and acquired practical experience and knowledge in one or more area of HI practice through work experience • Determining of appropriate data sources and gaps in data sources in relation to identified business needs across the healthcare system • Engages relevant stakeholders at the appropriate stages of the system life cycle • Contributes to the selection and utilization of appropriate information technologies to meet business requirements • Understands basic clinical terminology and commonly used abbreviations and acronyms • Recognizes commonly used formats, structures and methods for recording and communicating clinical data and how	• Work in collaboration with a variety of healthcare providers and other professionals to ensure the best possible delivery of healthcare • Use of audience-appropriate communication and language to present information and convey concepts to relevant stakeholders • Treat all persons equally and with respect and dignity • Avoid conflicts of interest openly, honestly and fairly	• Maintain and improve of the professional competence and knowledge-base

	workflow models to information technology solutions • Information technology best practices (e.g., quality management systems, testing, service level agreements, business continuity and incident management) throughout the system life cycle • Best practices and solutions to manage the security of data, systems, devices and networks • Understanding of architectural relationships between key health information technology components and best practices in enterprise architecture frameworks/perspectives • Knowledge of basic clinical and biomedical concepts, clinical care processes, technologies and workflow for purposes of analysis, design, development and implementation of health information systems and applications • Knowledge of health and health systems (in Canada) and information to work products and services, including: key characteristics (e.g., governance, funding, structures, agencies, related organizations, emerging trends, etc.); determinants of health (e.g., environment, genetics, socioeconomic); key factors affecting healthcare (e.g., demographics, supply and distribution of health professionals, new technologies, incentives) • Knowledge of the way HI benefits are realized and measured in the (Canadian) healthcare system • Understanding of different types of (Canadian) healthcare delivery models across the continuum of care and their interrelationships (e.g., hospitals, clinics, ambulatory centres and community health agencies, regional health authorities) • Knowledge of how people, resources and information flow through the health system	these are incorporated into system and application use • Fosters the adoption and use of health information systems in clinical settings • Facilitates appropriate consumer use of health information and communication technologies • Assesses and mitigates clinical safety risks associated with health information and systems throughout the system life cycle • Facilitates clinicians' use of electronic decision support tools in accessing evidence to support practice • Understands the need to balance the privacy of personal health information with improved care delivery and health system management • Promotes the safe and appropriate use of health information technologies to ensure patient safety • Contributes to organizational plans and strategies to ensure that information and systems enable business goals and strategy • Promotes an information culture by facilitating appropriate uses of information and knowledge • Facilitating self, individual, team and organizational learning and development of use of appropriate technologies, communication channels and organizational skills • Ongoing evaluation of the functionality of systems so that they can evolve to support best practice in clinical care • Identifies and frames information queries in collaboration with stakeholders in order to meet their needs for analysis and interpretation of data		

	• Knowledge of the roles and relationships of health professionals along with the organizational and regulatory structure in which they work • Challenges of the adoption and realization of clinical value of information systems in the health sector • Basic theories, concepts and practices of management including: organizational behaviour and culture, human resources, financial and budget management, governance, accountability, risk analysis and management procurement and vendor relationships, and customer relationships • Best practices in quality improvement and process engineering to facilitate business and clinical transformation • Best practices of change management in the implementation of new processes or systems • Project management principles and best practices (e.g., project charter, scope, life cycle, budgets, resourcing, timelines, milestones, monitoring, status reports) • Understanding of appropriate analytical and evaluation techniques and concepts (e.g., qualitative and quantitative methods, basic statistical and epidemiological techniques, indicators and evaluation measures) • Knowledge of indicators and metrics for healthcare delivery and systems management	• Identifies relevant sources of data and information in order to: assess the quality of information, and draw appropriate conclusions • Quality analysis by organizing and transforming data into reliable and meaningful information for diverse audiences • Presenting of data and information in a way that is effective for users		
Master / Dissertation (Forschung und Leitungsposition)				

Quelle: Canada's Health Informatics Association (COACH), Health Informatics Professional Core Competencies v3.0, Canada's Health Informatics Association, National Office, Toronto, 2012.

4 Global Academic Curricula Competencies for Health Information Professionals – GHWC

The Global Academic Curricula Competencies for Health Information Draft for Public Comment is a resource for academic programs across health information professions including Health Information Management (HIM), Health Informatics (HI), and Health Information and Communication Technologies (HICT). The overarching goal of this initiative is to articulate a common global language between education and industry to develop competency-based curriculum, certifications, and training initiatives which will assist in the development of a global e-health workforce.

Overview

As e-health technologies expand globally, human resources are the most critical prerequisite for the implementation and on-going management of health information, communication, and technologies. Healthcare systems require a well-trained and highly-skilled workforce. To ensure that this workforce is available, a comprehensive healthcare education and workforce strategy is needed, beginning with a solid academic curricula standard to guide post-secondary education. Many countries and regions have not yet recognized or established an infrastructure to train, hire, and deploy health information professionals to support their healthcare system and e-health strategies. The Global Academic Curricula Competencies for Health Information Professionals provides a valuable resource in identifying the core competencies for the professional and supporting the development of related academic programs. For those countries and regions with established health information related professions, the global curricula may be a useful resource for future updates and program expansion.

Scope

The first version of the Global Health Information Curricula Competencies identifies the academic requirements for three overarching health information professional areas. The GHWC recognizes that there are specialty areas (such as biomedical and nursing informatics) with additional curricula competencies and seeks comments on the requirements in these areas for future versions of the global curricula.

- Health Information Management (HIM): The practice of acquiring, analysing, and protecting digital and traditional medical information vital to providing quality patient care and maintaining the daily operations management of health information and electronic health records. They often serve in bridge roles, connecting clinical, operational, and administrative functions. These professionals affect the quality of patient information and patient care at every touch point in the healthcare delivery cycle. HIM professionals ensures an organization has the right information on hand when and where it is needed while maintaining the highest standards of data integrity, confidentiality, and security.

- Health Informatics (HI): A science that defines how health information is technically captured, transmitted, and utilized. Health informatics focuses on information systems, informatics principles, and information technology as it is applied to the continuum of healthcare delivery. It is an integrated discipline with specialty domains that include management science, management engineering principles, healthcare delivery and public health, patient safety, information science and computer technology. Health Informatics programs demonstrate uniqueness by offering varied options for practice or research focus.

- Health Information and Communication Technologies (Health ICT): The technical infrastructure used to manage and secure health information, and the exchange of health information in a digital format. Professionals who work in health ICT are focused on the technical side of managing health information and systems, working with software and hardware used to manage and store patient data. HICT professionals are usually from Information

Technology backgrounds, and provide support for electronic health records, mobile technologies, devices, and other systems used to secure health information.

Development Process

The global curricula is designed to be open-source and developed through a transparent, consensus-based process. To create this first version, the AHIMA Foundation's Council on Excellence in Education 2014 associate, baccalaureate, and graduate degree HIM competency resource was used as the foundation for expansion. The GHWC mapped and added professional competency requirements from other HIM, HI, and HICT/ICT sources (noted in the Foreword section) and held a three day meeting in August 2014 to design the global curricula, reconcile content across the various resources, and assign a competency level using the Bloom's Taxonomy.

The GHWC seeks public comment from associations and organizations that represent health information professionals, employers, and/or policy-makers to refine the global curricula. The GHWC meets in Dublin, Ireland in mid-January 2015 to review the comments, revise the curricula, and will release version 1.0 in early 2015. Reconciliation of comments will be documented and communicated back to the commenting association/organizations.

In der folgenden (Kompetenz-) Tabelle sind jeweils nur die Oberpunkte der Module des Berichts aufgeführt und dem Bachelorprogramm zugeordnet worden. Zudem wurden im Anhang genannte Fertigkeiten und Kompetenzen ergänzt. Einzelne bzw. detailliertere Inhalte der Module sind dem Originaldokument ab Seite 6 zu entnehmen. Hier erfolgt ebenfalls eine Zuordnung zu den Voraussetzungen Basis, Bachelor und Master (Entry, Intermediate, Advanced). Dieses erfolgt nach folgendem Schema:

Module Title: Describes the content area

Module Overview: A brief statement that summarizes the scope of the competencies for the module.

Academic Curricular Competencies by Academic Level

Entry	Blooms	Intermediate	Blooms	Advanced	Blooms
The academic competencies for entry level academic programs such as two-year Associate degree. ***Each academic level is meant to stand on its own and not build from entry to advanced.***		*The academic competencies for intermediate level academic programs such as four year Bachelor degree.*		*The academic competencies for advanced/graduate level academic programs such as Masters or Doctoral degrees.*	

Designating a ***Bloom's Level*** *enables educators to develop learning objectives and assessments based upon an appropriate cognitive level. See Appendix D for more information on Bloom's Taxonomy and the hierarchy used.*

Related Curricular Considerations for Academic Level

Entry Curricular Considerations	Intermediate Curricular Considerations	Advanced Curricular Considerations

The curricular considerations are guidelines on the curricula content covered for the academic level to support the competency requirements and related Blooms level.

For Future Development:

Additional comments are welcome (but not required) to allow the GHWC to begin gathering data for future resource development and versions of the curricula competencies. Areas of interest include:

- *Workforce roles/jobs that utilize these academic competencies*
- *Related Knowledge, Skills and Abilities (KSA's) desired by employers*
- *Related Occupational Standards (e.g. national standards of performance individuals must achieve when carrying out functions in the workplace)*
- *Related academic resources for this module*

	Fachkompetenz		Personale Kompetenz	
	Wissen	**Fertigkeiten**	**Sozialkompetenz**	**Selbständigkeit**
Basis (Vorausset-zungen)	• Applied knowledge: Reading, writing, mathematics, science, technology, critical thinking (from NNBIA)	• Demonstrate effective written and oral communication skills • Personal skills: Integrity, initiative, depend-ability and reliability, adaptability, profes-sionalism (from NNBIA) • Workplace skills: Planning and organizing, problem solving, decision making, business fundamentals, customer focus, working with tools and technology (from NNBIA)	• Demonstrate the ability to be a team player • People skills: Teamwork, communication, respect (from NNBIA)	
Bachelor (Praxis)	• Analytics and Statistics • Change Management • Classification of Disease, Coding Diagnoses and Procedures • Clinical Documentation Improvement	• Facilitate effective communication between various healthcare stakeholders and disci-plines • Play an educational role in the health in-		

	• Data Management and Governance • Data Quality and Information Integrity • Ethics • Financial Management • Health Information Access, Disclosure and Exchange • Health Information Systems and Application Design and Planning • Health Information Systems and Application Development/Deployment • Health Information Systems and Application Support • Health Law, Regulation, Accreditation and Certification • Health Record Content and Documentation • Human Ressource Management • Information and Systems Governance • Information Protection: Privacy, Confidentiality, and Security • Information Security Strategy and Management • Organisational Management and Leadership • Project Management • Purchasing and Contracting • Quality Management • Research Design and Methods • Risk Management • Standards for Data Content, Health Information Exchange and Interoperability • Strategic Planning • Training and Development • Work Design and Process Improvement	formation environment		
Master / Dissertation (Forschung und Leitungsposition)		• Apply strategies and techniques to facilitate the adoption of health information tools • Demonstrate knowledge regarding the complexity of adoption processes related to the processes of technology and knows how to propose solutions to them.		

Quelle: Global Health Workforce Council (GHWC), Global Academic Curricula Competencies for Health Information Professionals, Draft for public comment, The AHIMA Foundation, Chicago, 2015, available from http://www.ahimafoundation.org/downloads/pdfs/Global%20Health%20Information%20Curricula_Draft%20for%20Public%20Comment_Final%20%282%29.pdf.

5 Recommendations of the International Medical Informatics Association (IMIA) on Education in Biomedical and Health Informatics

The International Medical Informatics Association (IMIA) agreed on revising the existing international recommendations in health informatics /medical informatics education. These should help to establish courses, course tracks or even complete programs in this field, to further develop existing educational activities in the various nations and to support international initiatives concerning education in biomedical and health informatics (BMHI), particularly international activities in educating BMHI specialists and the sharing of courseware.

In order to provide good-quality health care, training and education in biomedical and health medical informatics is needed:

- H for various *Health* care professions,
- E in different modes of *Education*,
- A with different, *Alternate* types of specialization in BMHI, and
- L at various *Levels* of education, corresponding to respective stages of career progression. There must be
- T qualified *Teachers* to provide BMHI courses, which lead to
- H recognized qualifications for biomedical and *Health* informatics positions.

Recommendations for Learning Outcomes in Biomedical and Health Informatics

For education in BMHI two kinds of major learning outcomes can be identified. They specify the 1. Learning outcomes for all health care professionals in their role as IT users: Enabling health care professionals to efficiently and responsibly use information and knowledge processing methodology and information and communication technology. These learning outcomes need to be included in all undergraduate curricula, leading to a health care professional qualification. On the other hand there are: 2. Learning outcomes for BMHI specialists: Preparing graduates for careers in BMHI in academic, health care (e.g. hospital, primary care), government or industrial settings. These learning outcomes need to be included in all curricula, leading to a qualification as specialist in BMHI. Obviously, between the specialization of a health care professional as IT user and a health care professional as a BMHI specialist, various levels concerning depth and breadth of learning outcomes exist. Some programs may focus on either health care professionals or on health informatics specialists. Other programs may focus on a kind of intermediary level, where students are educated to communicate with physicians and nurses as IT users on one side and health informatics specialists on the other side.

General Remarks

Educational course components in BMHI should be tailored to the student's advancement and where possible be made relevant for and used to support a given stage of student progression. For example, teaching about the patient record for students of medicine should be introduced after the student has gained some clinical experience, but not too late so that students can benefit from this knowledge in the latter stages of their clinical training.

Courses/Course Tracks for BMHI Specialists

In addition to the 'core' knowledge and skills obtained in each program, the relative amount of student workload for the three knowledge and skills areas inside the health/medical informatics course track should approximately be as indicated in the table on the right side. For all health care professionals domain area (2) should

Knowledge/Skill Area		Program Medicine, Nursing, Health Care Management, Dentistry, Pharmacy, Public Health
(1)	BMHI core knowledge and skills	40
(2)	Medicine, health and biosciences, health system organisation	5
(3)	Informatics/computer science, mathematics, biometry	15
Σ		60

focus on health system organization, area (3) on practical informatics and project management. For nurses it should be possible that specialization can be included in a postgraduate nursing curriculum. For health care managers, knowledge and practical skills of information systems architectures, incl. characteristics required to achieve semantic interoperability and information systems/ network management should particularly comprise work and information flow supporting enterprise functions for administration, controlling, quality management and executive decision making.

Recommendations for Biomedical and Health Informatics Courses as Part of Health Record Administration Programs

Within the past decade the discipline of health record administration (also denoted as health information management) has often enhanced its scope from document handling to managing health care information. Also the scope of practice has changed considerably. For educating health record administrators, two different levels of education are recommended:

- A first level should cover introductory concepts and principles and assumes an introductory skill level. Students at this level take e.g. a two- or three-year course of study at a college level resulting (e.g. in the U.S.) in an associate's degree. The focus for these students needs to be on data, meta-data, coding rules, classification systems and their relationship with health informatics.
- At a second level a deeper understanding of knowledge and more advanced terminology skills, problem solving and critical thinking skills in more depth is assumed. Students at this level take e.g. a three- or four-year course of study resulting in a bachelor degree where health information management skills and knowledge is integrated with more advanced informatics knowledge and skills. Health record administration students at the mentioned first level can be regarded as IT users.

Courses/Course Tracks for IT Users

Emphasis should be given to information literacy, health terminology, coding and classification systems, the electronic health record, and evaluation methodology. There should be introductory knowledge and skills in the knowledge/skill-domain medicine, health and biosciences, health systems organization.

Courses/Course Tracks for Biomedical and Health Informatics Specialists

Special emphasis should be given to information literacy, meta-data, health terminology, coding and classification systems, the electronic health record, and evaluation methodology and to the relationship between these concepts and the use of various informatics technologies.

Courses/Course Tracks for Biomedical and Health Informatics Specialists

In addition to the 'core' knowledge and skills of informatics/computer science, the relative amount of student workload for the three knowledge and skills areas inside the BMHI course track should approximately be as indicated in the table on the right side. The student workload in (3) comprises knowledge and skills in biometry, semantic interoperability and evaluation methods. Applying methods and tools of informatics in health care institutions, and for concrete problems in diagnosis, therapy, nursing and health care management should be emphasized. It is essential to include ontology-based software engineering and the need to separate knowledge from system configuration, as these concepts are fundamental to achieving semantic interoperability and safe clinical decision support systems. This assists informatics or computer science students to gain more knowledge about the health care environment.

Knowledge/Skill Area		Program Informatics/ Computer Science
(1)	BMHI core knowledge and skills	40
(2)	Medicine, health and biosciences, health system organisation	15
(3)	Informatics/computer science, mathematics, biometry	5
Σ		60

Health information systems management should include the development and implementation of software and hardware components of health information systems. In medical signal and image processing technical and informatics aspects should particularly be considered.

Recommendations for Bachelor Programs in Biomedical and Health Informatics

The objective of this undergraduate education is to equip students with specialized knowledge in the field of BMHI and the skills to apply the acquired knowledge in a variety of practical situations. The intention is to provide a deep understanding of the state-of-the-art of the discipline and the ability to translate expertise gained in the field into practical application of tools and concepts. Compared to the comprehensive formal methodological foundation of a master program, it is the practice-oriented application that predominates the undergraduate curriculum. Given the diversity of the discipline, students at the bachelor program level need to understand the breadth of the field and become familiar with the spectrum of BMHI (capturing all sub-domains such as bioinformatics, clinical informatics, public health informatics, etc.). The challenge herein is to provide knowledge and skills that students can apply in practice while recognizing that areas of interest could be explored further and in more-depth at the graduate educational level. This composition can be varied from very strong technical IT skill acquisition to less IT skill and a stronger health application focus, depending on the desired learning outcomes.

Knowledge/Skill Area		Program BMHI (bachelor)
(1)	BMHI core knowledge and skills	50
(2)	Medicine, health and biosciences, health system organisation	20
(3)	Informatics/computer science, mathematics, biometry	110
Σ		180

Recommendations for Master and Doctoral Programs in Biomedical and Health Informatics

The objective is to provide scientific education that captures the theoretical foundations of the field, provides specialized knowledge and equips students with both practical skills and analytical approaches that will allow them to further the knowledge base of the discipline. Graduates will be able to master both the practical methods and tools and the leadership of independent research. Unlike undergraduate bachelor programs, these graduate and post-graduate programs emphasize a formal penetration into the knowledge and foundation of the discipline and promote methodological expertise and independent analysis. Graduates are expected to contribute to the field and lead its scientific advancement. It is expected that master students have successfully finished either a) a bachelor program in BMHI, b) a bachelor or master program in medicine, biology, public health, health administration or another health science, or c) in computer science/information science. For cases b and c additional complementary courses (for b in informatics/computer science and for c in health and biosciences, health systems) should be offered. For programs leading to a doctoral degree, independent comprehensive research should be carried out by the student in addition to the instructional requirements already mentioned. Knowledge and skills should also have additional depth and breadth and students may choose to gain additional insight into elective fields that are at the core of their research.

Knowledge/Skill Area		Program BMHI (master)
(1)	BMHI core knowledge and skills	80 (40)
(2)	Medicine, health and biosciences, health system organisation	20 (10)
(3)	Informatics/computer science, mathematics, biometry	20 (10)
Σ		120 (60)

Continuing Education in Biomedical and Health Informatics

A certificate of 'Health Informatics', 'Medical Informatics' and/or 'Biomedical Informatics' should be offered in recognition of having acquired sufficient competence in BMHI from an academic, educational and/or practical perspective relative to specific tasks or roles within the health industry. Furthermore, for physicians, who usually have well-established forms of continuing education, there should be offered the possibility of receiving, in addition to their medical degree, the supplementary qualification of 'Health Informatics', 'Medical Informatics' and/or 'Biomedical Informatics'. This additional qualification can be issued by any national medical or

health professional association or university. The same holds true for nurses, for whom various forms of continuing education are very well-established in many countries. In order to offer courses in BMHI for continuing education, it is recommended that specific entities are established to provide such courses. These entities might be inside universities or, as academies of health/medical informatics established by any national association in BMHI or provided by an independent private entity, provided that in all cases the people responsible for course curriculum, content and educational delivery are suitably qualified.

Life-long Learning

Working in the field of BMHI and even using information and communication technology requires life-long learning. Therefore opportunities for continuing education should be offered for BMHI specialists as well as IT users of the various health professions. The ability of 'learning to learn' will become of particular importance.

How to Commence with Biomedical and Health Informatics Education

BMHI affects all health care professionals. To commence education in this field, IMIA recommends that education in BMHI for all types of health care professionals, including the different types of specialization and levels of education, is considered. The first step is to consider the level of practice of the individual. Work in informatics depends upon whether someone has a technical/informatics or clinical background. Within informatics, one may practice more at the applied level in operational settings or may be an academic who teaches and/or performs research.

Modes of Education

The next consideration for informatics educational programs is (are) the mode(s) of education to be chosen, considering the specific profile and possibilities of the respective universities. Besides lectures it is of importance that practical experience within health care institutions (e.g., in hospitals) is offered. Besides 'traditional' lectures and exercises within universities, different models of flexible, distance and supported open learning should be actively pursued. Problem-oriented learning might particularly support the relevance of BMHI as it requires integration of information and a cross-disciplinary understanding.

Recognized Qualifications

Education of students in BMHI, which goes beyond introductory courses in the use of information and communication technology, only makes sense if positions for these graduates exist or are created. The qualifications of such BMHI graduates must be recognized and we are recommending that health care organizations realize the need of positions as specialists in BMHI.

IMIA Certification

BMHI courses inside programs and specialized programs in this field can upon request add to the description of their course track or program the phrase 'endorsed by the International Medical Informatics Association' and can use the IMIA logo in this context. This is conditional to the IMIA recommendations being fulfilled and once the quality of the program, including organizational integration and resources, has been assessed by IMIA-appointed experts. Single courses cannot be considered, only course tracks or programs. The fulfilment of the recommendations and the assessment of the quality of the program will be examined by a committee usually consisting of four members of IMIA's Working Group on Health and Medical Informatics Education or other persons, experienced in BMHI education, and will be approved by the IMIA President and the Chairperson of IMIA's Working Group on education.

	Fachkompetenz		Personale Kompetenz	
	Wissen	**Fertigkeiten**	**Sozialkompetenz**	**Selbständigkeit**
Basis (Voraus-setzungen)	• Evolution of informatics as a discipline and as a profession • Need for systematic information processing in health care, benefits and constraints of information technology in health care • Characteristics, functionalities and examples of information systems in health care (e.g. clinical information systems, primary care information systems, etc.) • Characteristics, functionalities and examples of information systems to support patients and the public (e.g. patient-oriented information system architectures and applications, personal health records, sensor-enhanced information systems) • Fundamentals of human functioning and biosciences • Fundamentals of what constitutes health, from physiological, sociological, psychological, nutritional, emotional, environmental, cultural, spiritual perspectives and its assessment • Basic informatics terminology like data, information, knowledge, hardware, software, computer, networks, information systems, information systems management	• Use of personal application software for documentation, personal communication including Internet access, for publication and basic statistics • Ability to use personal computers, text processing and spreadsheet software, easy to use database management systems • Ability to communicate electronically, including electronic data exchange, with other health care professionals, internet/intranet use	• It is important to recognize the need for teamwork as all health informatics projects require input from more than one person each with their own unique skill set, so that the team as whole is able to address all project aspects in a cohesive and coordinated manner	• Working in the field of BMHI and even using information and communication technology requires life-long learning
Bachelor (Praxis)	• Information literacy: library classification and systematic health related terminologies and their coding, literature retrieval methods, research methods and research paradigms • Architectures of information systems in health care; approaches and standards for communication and cooperation and for interfacing and integration of component, architectural paradigms (e.g. service-oriented architectures) • Management of information systems in health care (health information management, strategic and tactic information management, IT governance, IT service management, legal and regulatory issues) • Methods and approaches to regional networking and shared care (eHealth, health telematics applications and inter-organizational information exchange) • Structure, design and analysis principles of the health record including notions of data quality, minimum data sets, architecture and general applications of the electronic patient record/electronic health record • Socio-organizational and socio-technical issues, including work-	• Efficient and responsible use of information processing tools, to support health care professionals' practice and their decision making • Appropriate documentation and health data management principles including ability to use health and medical coding systems, construction of health and medical coding systems • Informatics methods and tools to support education (incl. flexible and distance learning), use of relevant educational technologies, incl. Internet and World Wide Web		

	flow/process modelling and reorganization • Principles of data representation and data analysis using primary and secondary data sources, principles of data mining, data warehouses, knowledge management • Biomedical modelling and simulation • Ethical and security issues including accountability of health care providers and managers and BMHI specialists and the confidentiality, privacy and security of patient data • Nomenclatures, vocabularies, terminologies, ontologies and taxonomies in BMHI • Principles of clinical decision making and diagnostic and therapeutic strategies • Organisation of health institutions and of the overall health system, interorganizational aspects, shared care • Policy and regulatory frameworks for information handling in healthcare • Principles of evidence-based clinical practice • Health administration, health economics, health quality management and resource management, patient safety initiatives, public health services and outcome measurement • Methods of theoretical informatics/computer science e.g. complexity theory, encryption/security • Methods of technical informatics/computer science, e.g. network architectures and topologies, telecommunications, wireless technology, virtual reality, multimedia • Methods of interfacing and integration of information system components in health care, interfacing standards, dealing with multiple patient identifiers • Handling of the information system life cycle: analysis, requirement specification, implementation and/or selection of information systems, risk management, user training • Methods of project management and change management (i.e. project planning, resource management, team management, conflict management, collaboration and motivation, change theories, change strategies) • Mathematics: algebra, analysis, logic, numerical mathematics, probability theory and statistics, cryptography • Methods for decision support and their application to patient			

	management, acquisition, representation and engineering of medical knowledge; construction and use of clinical pathways and guidelines • Basic concepts and applications of ubiquitous computing (e.g. pervasive, sensor-based and ambient technologies in healthcare, health enabling technologies, ubiquitous health systems and ambient assisted-living) • Usability engineering, human-computer interaction, usability evaluation, cognitive aspects of information processing • Optional Modules in BHMI and from Related Fields: Biomedical imaging and signal processing; Clinical/Medical bioinformatics and computational biology; Health-enabling technologies, ubiquitous health systems and ambient-assisted living; Health information sciences; Medical chemo informatics; Medical Nano informatics; Medical robotics; Public health informatics			
Master / Dissertation (Forschung und Leitungsposition)	• Methods of practical informatics/computer science, including programming languages, software engineering, data structures, database management systems, information and system modelling tools, information systems theory and practice, knowledge engineering, (concept) representation and acquisition, software architectures • Biometry, epidemiology, and health research methods, including study design	• Evaluation and assessment of information systems, including study design, selection and triangulation of (quantitative and qualitative) methods, outcome and impact evaluation, economic evaluation, unintended consequences, systematic reviews and meta-analysis, evidence-based health informatics		

Quelle: J. Mantas, E. Ammenwerth, G. Demiris, A. Hasman, R. Haux, W. Hersh, E. Hovenga, K.C. Lun, H. Marin, F. Martin-Sanchez and G. Wright, Recommendations of the International Medical Informatics Association (IMIA) on Education in Biomedical and Health Informatics, *Methods Inf Med* **49(2)** (2010), 105–120.

6 The TIGER Initiative: Informatics Competencies for Every Practicing Nurse: Recommendations from the TIGER Collaborative.

The TIGER Initiative, an acronym for **T**echnology **I**nformatics **G**uiding **E**ducation **R**eform, was formed in 2004 to bring together nursing stakeholders to develop a shared vision, strategies, and specific actions for improving nursing practice, education, and the delivery of patient care through the use of health information technology (HIT). In 2006, the TIGER Initiative convened a summit of nursing stakeholders to develop, publish, and commit to carrying out the action steps defined within this plan. The Summary Report titled *Evidence and Informatics Transforming Nursing: 3-Year Action Steps toward a 10-Year Vision* is available on the website at www.thetigerinitiative.org.

Since 2007, hundreds of volunteers have joined the TIGER Initiative to continue the action steps defined at the Summit. The TIGER Initiative is focused on using informatics tools, principles, theories and practices to enable nurses to make healthcare safer, more effective, efficient, patient-centered, timely and equitable. This goal can only be achieved if such technologies are integrated transparently into nursing practice and education. Recognizing the demands of an increasingly electronic healthcare environment, nursing education must be redesigned to keep up with the rapidly changing technology environment.
Collaborative teams were formed to accelerate the action plan within nine key topic areas. All teams worked on identifying best practices from both education and practice related to their topic, so that this knowledge can be shared with others interested in enhancing the use of information technology capabilities for nurses. Each collaborative team researched their subject with the perspective of "What does every practicing need to know about this topic?" The teams identified resources, references, gaps, and areas that need further development, and provide recommendations for the industry to accelerate the adoption of IT for nursing. The TIGER Initiative builds upon and recognizes the work of organizations, programs, research, and related initiatives in the academic, practice, and government working together towards a common goal.

The most recent 2008 American Nurses Association Nursing Informatics Scope and Standards defines nursing informatics as *the integration of nursing science, computer and information science, and cognitive science to manage communication and expand the data, information, knowledge, and wisdom of nursing practice*. Nurses certified in Nursing Informatics are:

- skilled in the analysis, design, and implementation of information systems that support
- nursing in a variety of healthcare settings
- function as translators between nurse clinicians and information technology personnel
- insure that information systems capture critical nursing information

These specialized nurses add value to an organization by:

- increasing the accuracy and completeness of nursing documentation
- improving the nurse's workflow
- eliminating redundant documentation
- automating the collection and reuse of nursing data
- facilitating the analysis of clinical data, including Joint Commission indicators, Core Measures, federal or state mandated data and facility specific data

	Fachkompetenz		Personale Kompetenz	
	Wissen	**Fertigkeiten**	**Sozialkompetenz**	**Selbständigkeit**

Basis (Voraussetzungen)	Basis Computer Competency (siehe Datei)
	 
	ListingOfAllRecon
	Themen:
	• Hardware
	• Software
	• Networks
	• ICT in Everyday Life
	• Security
	• Law
	• Operation System
	• File Management
	• Utilities
	• Print Management
	• Using the Application
	• The Internet
	• Using the Browser
	• Using the Web
	• Web Outputs
	• Electronic Communication
	• Using e-mail
	• e-mail Management
	
	Clinical Information Management:
	• Concepts: Have knowledge of various types of Health Information Systems and their clinical and administrative uses
		Basic Computer Competency (siehe Datei)
		 
		ListingOfAllRecon
		Themen:
		• Hardware
		• Software
		• Networks
		• ICT in Everyday Life
		• Security
		• Law
		• Operation System
		• File Management
		• Utilities
		• Print Management
		• Using the Application
		• The Internet
		• Using the Browser
		• Using the Web
		• Web Outputs
		• Electronic Communication
		• Using e-mail
		• e-mail Management
		
		Information Literacy:
		• Determine the nature and extent of the information needed
		• Access needed information effectively and efficiently
		• Evaluate information and its
				Clinical Information Management:
				• Due Care:
				  ○ Assure Confidentiality of protected patient health information when using Health Information Systems under his or her control
				  ○ Assure Access Control in the use of Health Information Systems under his or her control
				  ○ Assure the Security of Health Information Systems under his or her control
				
				Information Literacy:
				• Individually or as a member of a group, use information effectively to accomplish a specific purpose
				• Evaluate outcomes of the use of information

	• Policy and Procedure: Understand the Principles upon which organizational and professional Health Information System use by healthcare professionals and consumers are based.	sources critically and incorporates selected information into his or her knowledge base and value system Clinical Information Management: • Concepts: Verbalize the importance of Health Information Systems to clinical practice • User Skills: Have the User Skills as outlined in direct care component of the HL7 EHRS model, which includes all of the ECDL-Health User Skills of Navigation, Decision Support, Output Reports and more.		
Bachelor (Praxis)				
Master/Dissertation (Forschung und Leitungsposition)				

Quelle: TIGER Initiative, Informatics Competencies for Every Practicing Nurse: Recommendations from the TIGER Collaborative, Chicago: Healthcare Information and Management Systems Society (HIMSS), Chicago, 2015, available from http://www.thetigerinitiative.org/docs/tigerreport_informaticscompetencies.pdf.