OHSU – Biomedical Informatics Graduate Program - Core Competencies Mapped to Student Learning Outcome Measures for PhD in Health and Clinical Informatics

Intended Use: This rubric is meant to be a guide for students and their advisors and mentors to help track their progress through the HCIN PhD degree program. Measurements are a suggestion – feel free to add as you see fit!

Professional Knowledge and Skills	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Apply a broad knowledge of health and clinical informatics, and related disciplines, to solve problems in research, clinical and educational settings.			
Knowledge base	Advanced understanding of the knowledge base related to biomedical informatics	Basic knowledge base related to biomedical informatics	• Give a symposium presentation on their research topic • Initial presentation of dissertation proposal • Glossary of terms is recommended for non-experts • DAC (Dissertation Advisory Committee) meetings and summary reports • BMI 610—prepare 10-15 page paper that defines an informatics problem, summarizes relevant literature, proposes a solution • BMI 612-- complete a group project designed around a clinical informatics case scenario • BMI 617—present a group Health Information Technology project that applies concepts in conflict resolution, organizational behavior, and team dynamics • BMI 618-- create a project plan applying concepts of working collaboratively and productively within multidisciplinary project teams
Advancements	An in-depth understanding of the advancements in biomedical informatics	Basic or lack of understanding of the advancements in biomedical informatics	
Specialization	Advanced knowledge of one specialization in biomedical informatics	Poor or basic knowledge of one specialization in biomedical informatics	
Development of new knowledge	Develops new knowledge in their specialized field	Incomplete or lack of development of new knowledge in their specialized field	

			• BMI 630—complete *Disease and Clinician* project that demonstrates understanding of the context, the vocabulary, and some of the challenges with supporting clinical work in real settings with informatics tools • BMI 636-- critically appraisal an article on Summarizing Evidence—Systematic Reviews and Meta-analysis. Choose an article published in the literature of the appropriate study type that was not mentioned in the lecture or textbook. Choose a study on a clinical topic. • BMI 638--Submit 1-page journal article critique of a medical decision-making analysis paper, pose 2 questions to students, respond to classmates' comments and questions, post a summary of the group discussion. • BMI 640—create a Jupyter notebook that trains and evaluates simple machine learning models • BMI 644—perform basic programming in Java or Python to access a MySQL database

			• BMI 660—develop a research proposal including research question, lit review, aims, methods, and lay language summary that might be submitted to an institutional IRB • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Submission of dissertation
Professional Identity and Ethical Behavior	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Apply fundamental knowledge of ethics in research and implement solutions that assure confidentiality, security and integrity while maximizing the availability of data, information, and knowledge..			
Academic integrity/Research ethics	Current principles of ethics and academic integrity are incorporated into all aspects of research.	Lack of awareness, or lack of application, of current principles of academic integrity and research ethics	• Initial presentation of dissertation proposal • DAC (Dissertation Advisory Committee) meetings and summary reports • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Submission of dissertation • BMI 624--Conceptualize analytical reporting needs in a use case and create 4 visualizations in Tableau to support the conceptualization. Identify the consumers/users of the visualizations and create tailored
Manage data	Record data in prescribed format in timely, accurate and complete manner.	Record experimental results with flaws in timeliness, accuracy and organization.	
Data security	Conform to current standards of data security as determined by University policy and practice	Does not conform to current standards of data security as determined by University policy and practice	

			visualizations to inform those users to show Comparison, Relationship, Composition, and Distribution, including appropriate labeling. • BMI 640—create a Jupyter notebook that trains and evaluates simple machine learning models • BMI 644—perform basic programming in Java or Python to access a MySQL database • BMI 646—give a 5-10 minute slide talk presenting hypothetical software system overview • BMI 648—Team design/redesign interface for a use case, create a prototype and evaluate the design/redesign; group presentation of project • BMI 676-- prepare a 6-page, single-spaced paper on an ethics topic in informatics • Course Midterms • Course Finals • Passing other larger course projects
Information Literacy	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Engage in lifelong learning through: finding, interpreting and critically appraising scientific literature in order to fill knowledge gaps and stay informed of scientific advances; synthesizing and applying new knowledge to their own research; and connecting with the larger scientific community through participating in scientific conferences and societies.			
Literature review	Critical review of the relevant scientific literature	Basic or missing review of the relevant scientific literature	• Present a symposium on their

Research advancement	Substantial critical evaluation of recent advancements in the field of research	Some or no critical evaluation of recent advancements in the field of research	research topic: present literature review, identify gaps in research, propose possible dissertation research questions, obtain feedback from faculty and students • Presentation of dissertation proposal • DAC (Dissertation Advisory Committee) meetings and summary reports • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Glossary of terms is recommended at final presentation defense for non-experts • Submission of dissertation • BMI 652A,B-- prepare a Specific Aims page, execute an informatics project • BMI 660--develop a research proposal including research question, lit review, aims, methods, and lay language summary that might be submitted to an institutional IRB • BMI 661-- write field notes based on observations that would be useful to a team; analyze qualitative data to produce credible results
Research objectives	Systematic approach to address research objectives	Incomplete/disorganized approach to address research objectives	
Research results	Research results are presented comprehensively	Research results are not presented comprehensively	
Recommendations for further research	Possible future directions of research are clearly presented	Possible future directions of research are unclear.	

			• Vollum Scientific Writing Class-- Students attend short lectures, actively participate in class discussion and complete workshop-style writing assignments to help researchers learn to write better papers and grants. Includes six individual tutorials with instructor.
Communication	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLOs: • Effectively communicate and disseminate scientific research in written and verbal form to both peers and non-experts. • Communicate professionally, including during interactions with others, and while giving and receiving feedback.			
Writing skills	Well-written dissertation and organization supports the objectives. Content is clear and coherent.	Poorly written and poorly organized, content unclear, lapses in coherence	• Present a symposium on their research topic • Student initial presentation of dissertation proposal • DAC (Dissertation Advisory Committee) meetings and summary reports • Research rotations-- Complete at least 2 BMI 601 Research Rotations to gain exposure to labs' research, processes, and directors. • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Glossary of terms is recommended at final presentation defense for non-experts • Submission of dissertation
Speaking skills	Spoken explanations are complete, clear and concise	Spoken explanations are not complete, clear and/or concise	
Audience awareness	Audience knowledge was considered in presentation of topic	Audience knowledge was not considered in presentation of topic	
Response to feedback	Actively listens and responds appropriately and respectfully to feedback	Responds inappropriately and/or disrespectfully to feedback	
Integrating feedback	Documents and addresses feedback; seek out opportunities for feedback	Does not document or address feedback; does not seek out opportunities for feedback	

			• Glossary of terms is recommended at final presentation defense for non-experts • BMI 605F—lead discussion of a journal article, give practice conference presentation or dissertation defense • BMI 670-- prepare and revise a term paper on a chosen biomedical informatics topic and prepare a presentation on the same topic using inclusive language. • Vollum Scientific Writing Class-- Students attend short lectures, actively participate in class discussion and complete workshop-style writing assignments to help researchers learn to write better papers and grants. Includes six individual tutorials with instructor.
Respect for others	Interacts respectfully with all peers, faculty, and staff	Does not interact respectfully with all peers, faculty and staff	
Teamwork	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Function as a productive member of a multidisciplinary collaborative team of informatics, information technology, clinical, administrative, and other experts.			
Teamwork	Works professionally, collegially and effectively as team member/collaborator	Does not work professionally, collegially and/or effectively as team member/collaborator	• Student initial presentation of dissertation proposal • Annual Review • DAC (Dissertation Advisory Committee) meetings – reports • Research rotations

			• Successful defense of dissertation • Glossary of terms is recommended at final presentation defense for non-experts • Submission of dissertation • BMI 612-- complete group project designed around clinical informatics case scenarios • BMI 617—present a group Health Information Technology project that applies concepts in conflict resolution, organizational behavior, and team dynamics • BMI 618—create project plan applying concepts of working collaboratively and productively within multidisciplinary project teams • BMI 619-- Prepare a 6-11 page paper that discusses a subject in Business in Health that is of particular interest to you. You may choose an issue in your organization to study. Page 1 should be a one-page executive summary, as you would present to your organization's CEO or CMIO. • BMI 637--10-page team paper that critiques a problem in healthcare quality

			management from the beginning of the problem to the development of a solution • BMI 648— Interdisciplinary team design/redesign interface for a use case, create a prototype and evaluate the design/redesign; group presentation of project • BMI 661-- write field notes based on observations that would be useful to a team; analyze qualitative data to produce credible results • Course Midterms • Course Finals • Passing other larger course projects
Community Engagement, Social Justice and Equity	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Integrate the culture and diversity of a population when developing research ideas, conducting research, evaluating implementation, and/or interpreting research findings.			
Empathy toward others	Demonstrates empathy toward the culture and diversity of all stakeholders	Treats others with respect; follows standard practices	• Student initial presentation of dissertation proposal • Annual Review • DAC (Dissertation Advisory Committee) meetings – reports • Successful defense of dissertation • Glossary of terms is recommended at final presentation defense for non-experts • Submission of dissertation • Research rotations • Course Midterms

			• Course Finals • Passing other larger course projects • Participation in at least 2 events each year that promote diversity in the workforce, education or patient care • BMI 617-- present a group Health Information Technology project that applies concepts in conflict resolution, organizational behavior, and team dynamics • BMI 670-- prepare and revise a term paper on a chosen biomedical informatics topic and prepare a presentation on the same topic using inclusive language. • BMI 676-- Watch video created by an African-American woman about healthcare issues for Black Americans and potential trust issues. • BMI 676-- Select one culture/area of diversity you have limited knowledge in. Locate a research article to discuss how information on bias applies; cite the article.
Patient Centered Care	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO:			

• Demonstrate and promote informatics solutions that help to ensure patient safety within relevant clinical settings.			
Safety Standards	Complies with safety and regulatory standards	Does not comply with safety and regulatory standards	• Research rotations • BMI 612-- complete group project designed around clinical informatics case scenarios • BMI 637--10-page team paper that critiques a problem in healthcare quality management from the beginning of the problem to the development of a solution • BMI 676-- prepare a 6-page, single-spaced paper on an ethics topic in informatics

Adapted from: Western University, Ontario, Canada: Learning Outcomes: Evolution of Assessment and Van Andel Institute