OHSU – Biomedical Informatics Graduate Program - Core Competencies Mapped to Student Learning Outcomes Measures for Graduate Certificate 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 Graduate Certificate. 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 knowledge of health and clinical informatics, and related disciplines in clinical and/or industrial settings.			
Knowledge base	Good understanding of the knowledge base related to biomedical informatics	Poor understanding of the knowledge base related to biomedical informatics	• BMI 510—prepare 10-15 page paper that defines an informatics problem, summarizes relevant literature, proposes a solution • BMI 512-- complete group project designed around clinical informatics case scenarios • BMI 517—present a group Health Information Technology project that applies concepts in conflict resolution, organizational behavior, and team dynamics • Course Midterms • Course Finals • Passing other larger course projects
Advancements	A clear understanding of the advancements in biomedical informatics	Lack of understanding of the advancements in biomedical informatics	
Specialization	Knowledge of one or more specializations in biomedical informatics	Poor knowledge of one or more specializations in biomedical informatics	
Application of knowledge	Accurate and systematic application of existing knowledge to analyze the research, clinical or industry problem	Inaccurate and inconsistent application of existing knowledge to analyze the research, clinical or industry problem	
Reasoning and Judgement	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Identify and apply appropriate informatics theories, methods and tools to analyze, contextualize, and interpret results.			
Critical thinking	Viewpoints presented in the scientific literature are questioned	Viewpoints presented in the scientific literature are taken as fact, without question	• Possible course alignment: • BMI 510—prepare 10-15 page paper that defines an informatics problem, summarizes relevant literature, proposes a solution
	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding	Issue/problem to be considered critically is stated without clarification or description, or is otherwise unclear.	

Critical analysis	Research results are explained in the context of the given objectives, including whether results were validated, which may lead to future research	Research results are not explained. Validity of results is not mentioned.	• BMI 524-- 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 visualizations to inform those users to show Comparison, Relationship, Composition, and Distribution, including appropriate labeling. • BMI 560—develop a research proposal including research question, lit review, aims, methods, and lay language summary that might be submitted to an institutional IRB • BMI 561-- write field notes based on observations that would be useful to a team; analyze qualitative data to produce credible results • BSTA 525-- Use STATA software and R programming language to conduct simple statistical analyses. • Course Midterms • Course Finals • Passing other larger course projects
	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes are identified clearly	Conclusion is inconsistently tied to some of the information discussed; related outcomes are oversimplified	
Evidence-based Practice and Research	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO:			

• Given a problem, formulate a plan, critically compare options, make timely decisions or recommendations, identify, and improve outcomes in light of evolving evidence.			
Literature review	Thorough review of the relevant scientific literature	Basic or missing review of the relevant scientific literature	• BMI 538-- 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 560—develop a research proposal including research question, lit review, aims, methods, and lay language summary that might be submitted to an institutional IRB • BMI 561-- 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
Research advancement	A careful review of recent advancements in the field of research	Some review of recent advancements in the field of research	
Research objectives	Coherent approach to understanding research objectives	Incoherent approach to understanding research objectives	
Research results	Research results are presented in a systematic way	Research results are not presented in a systematic way	
Decisions or recommendations	Decisions or recommendations are informed by recent advancements in the field	Decisions or recommendations are not informed by recent advancements in the field	
Lifelong Learning	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Engage in lifelong learning through: finding, interpreting and critically appraising professional literature in order to stay informed of advances in their chosen field; and connecting with the larger professional community through participating in conferences and societies.			
Conference participation	Presenting at research conference	Attending Thursday research conference	• Includes Thursday conference, OHSU research week, etc.
Communication	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLOs: • Effectively communicate 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 summary supports the objectives. Content is clear and coherent.	Poorly written and poorly organized, content unclear, lapses in coherence	• BMI 570-- prepare and revise a term paper on a chosen biomedical informatics topic and prepare a presentation on the same topic using inclusive language. • Course Midterms • Course Finals • Passing other larger course projects
Speaking skills	Spoken explanations are clear and concise	Spoken explanations are not clear and concise	
Audience awareness	Audience knowledge was considered in presentation of topic	Audience knowledge was not considered in presentation of topic	
Response to feedback	Actively listen and respond appropriately to feedback	Respond inappropriately 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	
Professionalism and Ethics	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Apply fundamental knowledge of ethics and implement solutions that assure confidentiality, security and integrity while maximizing the availability of data, information, and knowledge.			
Academic integrity/Research ethics	Awareness of academic integrity and research ethics	Lack of awareness of academic integrity and research ethics	• BMI 524-- 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 visualizations to inform those users to show Comparison, Relationship, Composition, and Distribution, including appropriate labeling. • BMI 540—create a Jupyter notebook that trains and evaluates simple machine learning models • BMI 544—perform basic programming in Java or Python to access a MySQL database
Manage data	Record data in prescribed format in timely, accurate and complete manner	Record experimental results with flaws in timeliness, accuracy and organizations	

			• BMI 546--5-10 minute slide talk presenting hypothetical software system overview • BMI 548—Team design/redesign interface for a use case, create a prototype and evaluate the design/redesign; group presentation of project • BMI 576-- prepare a 6-page, single-spaced paper on an ethics topic in informatics • BMI 576-- Watch the video created by an African-American woman about healthcare issues for Black Americans and potential trust issues. • BMI 576--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. • Course Midterms • Course Finals • Passing other larger course projects
Teamwork	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Function as a productive member of a multidisciplinary collaborative team of biological or other scientists, informatics, information technology, clinical, administrative, and other experts.			
Teamwork	Work collegially and effectively as team member/collaborator	Does not work collegially and effectively as team member/collaborator	• Team evaluations, feedback from sponsors,

			mentor/advisor, other peer, etc. • BMI 517, • BMI 518-- create project plan applying concepts of working collaboratively and productively within multidisciplinary project teams • BMI 519-- 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. • Course Midterms • Course Finals • Passing other larger course projects
Safety and Quality Improvement	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: • Demonstrate knowledge of 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	• BMI 512-- complete group project designed around clinical informatics case scenarios • BMI 576-- prepare a 6-page, single-spaced paper on an ethics topic in informatics • Passing other larger course projects
Systems	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**

• Demonstrate knowledge of health and health information problems by describing constraints (economic, regulatory) while considering the priorities of different stakeholders (including health care professionals, researchers, and patients).			
Systems Knowledge	Exhibit knowledge in the biological, health and clinical information systems domains that are related to the field of health and clinical informatics	Does not exhibit knowledge in the biological, health and clinical information systems domains that are related to the field of health and clinical informatics	• Course Midterms • Course Finals • Passing other larger course projects • BMI 512-- complete group project designed around clinical informatics case scenarios • BMI 517-- present a group Health Information Technology project that applies concepts in conflict resolution, organizational behavior, and team dynamics • BMI 518-- create project plan applying concepts of working collaboratively and productively within multidisciplinary project teams
Community Engagement, Social Justice and Equiry	**Meets expectations**	**Does not meet expectations**	**Possible Measurements**
SLO: Apply principles of social justice, equity, and/or anti-racism through community-engaged practice, service, or scholarship.			
Empathy toward others	Demonstrates empathy toward the culture and diversity of all stakeholders	Treats others with respect; follows standard practices	• BMI 517-- present a group Health Information Technology project that applies concepts in conflict resolution, organizational behavior, and team dynamics • BMI 576-- 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