OHSU – Biomedical Informatics Graduate Program - Core Competencies Mapped to Student Learning Outcome Measures for PhD in Bioinformatics and Computational Biomedicine

Rubric

Intended Use: This rubric is meant to be a guide for students and their advisors and mentors to help track their progress through the BCB 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 bioinformatics and computational biomedicine, and related disciplines, to solve problems in research, clinical and educational settings.			
Knowledge base	Advanced understanding of the knowledge base related to bioinformatics and computational biomedicine	Basic knowledge base related to bioinformatics and computational biomedicine	• Present a symposium on their research topic • Student initial presentation of dissertation proposal • DAC (Dissertation Advisory Committee) meetings – reports • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Submission of dissertation • BMI 650— Parameter selection in the context of sequence alignment is a critical component of optimization and protocol standardization. Using sequence data from the wild mouse
Advancements	An in depth understanding of the advancements in bioinformatics and computational biomedicine	Basic or lack of understanding of the advancements in bioinformatics and computational biomedicine	
Specialization	Advanced knowledge of one specialization in bioinformatics and computational biomedicine	Poor or basic knowledge of one specialization in bioinformatics and computational biomedicine	
Development of new knowledge	Develops new knowledge in their specialized field	Incomplete or lack of development of new knowledge in their specialized field	

			strain PWK, provide a naïve/brute-force analysis to set a threshold to determine the number of mismatches to allow in aligning the PWK to a reference (B6 mouse) using 100 base pair reads. Provide your code and a brief 1-2 page report summarizing your approach, assumptions, and limitations. After you have determined your mismatch threshold, please choose an appropriate aligner to align the provided data. Your written report should also include a discussion of the final alignment percentage. • BMI 651—final data analytics project via Kaggle • BMI 652A/B—prepare a Specific Aims page, execute an informatics project • BMI 653—lead a weekly paper discussion to develop and hone

			presentation skills
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	• Student initial presentation of dissertation proposal • DAC (Dissertation Advisory Committee) meetings – reports • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Submission of dissertation • BMI 635—reproduce, implement, debug, and document an established biomedical data analysis workflow, • BMI 646—slide presentation of hypothetical software system overview, • BMI 665—submit written analysis of a high throughput dataset • BMI 676
Manage data	Record data in prescribed format in timely, accurate and complete manner.	Record experimental results with flaws in timeliness, accuracy and organization	

			• Course Midterms • Course Finals • Passing other larger course projects
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	
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.			
Local/Regional conference participation	Presenting at local/regional conference	Attending Thursday research conference	• Attend Thursday conferences, submit to OHSU research week, attend and/or present at BioData Club, etc. • NLM trainees attend annual NLM trainee meeting • Attend other meeting as allowed • Attend conferences as interested • BMI 653---- lead a weekly paper discussion to develop and hone presentation skills
National/International conference participation	Presenting at national/international research conference	Does not present at national/international research conference	
Networking	Attend outside conferences to fill knowledge gaps and meet possible future collaborators	Does not attend outside conferences to fill knowledge gaps and meet possible future collaborators	
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 – reports • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Successful defense of dissertation • Submission of dissertation • Glossary of terms is recommended at final presentation defense for non-experts • BMI 652A/B-- prepare a Specific Aims page, execute an informatics project • 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.
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	

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 biological and related scientists, 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) reports • Research rotations • Successful defense of dissertation • Submission of dissertation • 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 652 A/B--prepare a Specific Aims page, execute

			an informatics project • BMI 653-- lead a weekly paper discussion to develop and hone presentation skills • 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 • Submission of dissertation • Research rotations • Course Midterms • Course Finals • Passing other larger course projects • Internships • Participation in at least 2 events each year that promote diversity in the workforce,

			education or patient care • Possible course alignment: BMI 676
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— present 5-10 page report on project assigned as Director of Clinical Informatics Systems, • 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 • Passing other larger course projects

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