<u>OHSU – Biomedical Informatics Graduate Program - Core Competencies Mapped to Student Learning Outcomes</u> <u>Measures for Graduate Certificate in Health and Clinical Informatics</u>

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 | Meets expectations | Does not meet | Possible Measurements |
|---|--|---|--|
| Knowledge and Skills | | expectations | |
| SLO: | | | |
| Apply knowled | ge of health and clinical informatics, | and related disciplines in cli | nical and/or industrial |
| settings. | | | Γ |
| Knowledge base | knowledge base related to biomedical informatics | related to biomedical informatics | BMI 510—prepare 10-15 page paper that defines an informatics problem, summarizes relevant |
| | advancements in biomedical informatics | the advancements in biomedical informatics | literature, proposes a solution |
| Specialization | specializations in biomedical informatics | or more specializations in biomedical informatics | • Bivil 512 Complete group project designed around |
| Application of knowledge Reasoning and Judgement SLO: | Accurate and systematic application of existing knowledge to analyze the research, clinical or industry problem Meets expectations | Inaccurate and inconsistent application of existing knowledge to analyze the research, clinical or industry problem Does not meet expectations | 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 |
| Identify and ap interpret result | ply appropriate informatics theories ts. | , methods and tools to analy | /ze, contextualize, and |
| 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 |
| | 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. | that defines an informatics problem, summarizes relevant literature, proposes a solution |

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

| recommendations, identify, and improve outcomes in light of evolving evidence. • BMI 538-submit 1 Literature review Thorough review of the relevant scientific literature • BMI 538-submit 1 Research A careful review of recent advancements in the field of research Some review of recent advancements in the field of research advancements in the field of research results are presented in a systematic way presented in a systematic way presented in a systematic way • BMI 508 develop research results are presented in a dvancements in the field nutreview alans, methods, and ray language Decisions or recommendations are not informed by recent advancements in the field devancements in the field of not field of research BMI 508 develop research results are proposal including research BMI 508 develop research results are presented in a systematic way • BMI 501 develop research results are proposal including research • BMI 501 write field notes advancements in the field advancements in the field an to spectra advancements in the field of research • BMI 501 write field notes are professional institutional IR8 • BMI 501 write field notes advances in their chosen fi | Given a problem, formulate a plan, critically compare options, make timely decisions or | | | |
|---|--|---|---|--|
| Literature review Thorough review of the relevant scientific literature Basic or missing review of the relevant scientific literature • BMI 358 – Submit 1 page journal article critique of a medica decision-making analysis paper, pos 2 questions to the field of research Research objectives Coherent approach to understanding research objectives Incoherent approach to understanding research objectives Incoherent approach to understanding research objectives 2 questions, post a students, respond t classmates' Decisions or recommendations Research results are presented in a systematic way Research results are presented in a systematic way • BMI 560 – develop research proposal including research advancements in the field • BMI 560 – develop research proposal including research question, lit review aims, methods, and lay language summary that mig be submitted to an institutional IR8 • BMI 560 – develop research proposal including research question, lit review aims, methods, and lay language summary that mig be submitted to an institutional IR8 Lifelong Learning Meets expectations Does not meet expectations Possible Measurement expectations SLO: • Engage in lifelong learning through: finding, interpreting and critically appraising professional literature order to stay informed of advances in their chosen field; and connecting with the large professional community through participating in conferences and societies. • Includes Thursday research conference • Includes Thursday research conference SLO: • Engage in lifelong learning through: findin | recommendations, identify, and improve outcomes in light of evolving evidence. | | | |
| Research advancement A careful review of recent advancements in the field of research Some review of recent advancements in the field of research advancements in the field of research Research objectives Coherent approach to understanding research objectives Incoherent approach to understanding research objectives Incoherent approach to understanding research objectives 2 questions to tudents, respond to understanding research objectives Decisions or recommendations recommendations recommendations Decisions or recommendations advancements in the field Research results are not presented in a systematic way BMI 560-develop research proposal including research oti informed by recent advancements in the field BMI 560-develop research proposal institutional IRF esum at advancements in the field Bill Source Decisions or resource BMI 560-develop research proposal institutional IRF esum advancements in the field BMI 560-develop research proposal institutional IRF esum advancements in the field Bill Source Decisions or resource Course Finals esum advancements in the field BMI S61-with field robes based on observations that would be useful to test based on observations that would be useful to test based on observations that would be useful to results SLO: Engage in lifelong learning through: finding, interpreting order to stay informed of advances in their chosen field; and connecting with the larger professional community through participating in conferences and societies. Ones not meet expectations Possible Measurement expectations SLO: Engage in lifelong learning throu | 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 |
| Research objectives Coherent approach to understanding research objectives Incoherent approach to understanding research objectives students, respond to classmates' comments and questions, post a summary of the systematic way Research results are presented in a systematic way Research results are presented in a systematic way Research results are not presented in a systematic way BMI 560-develop recommendations are not informed by recent advancements in the field BMI 560-develop research proposal including research question, lit review ains, methods, and lay language summary that migh be submitted to an institutional IRB BMI 560-develop research results BMI 561-wirte fiel note based on observations that would be useful to team; analyze qualitative data to produce credible results Lifelong Learning Meets expectations Does not meet expectations Possible Measurement expectations SLO: - Fresenting at research conference Nets expectations Does not meet expectations Possible Measurement expectations SLO: - Fresenting at research conference Presenting at research conference - Includes Thursday conference Communicate professionally, including during interactions Does not meet expectations Possible Measurement expectations - SLO: - Effectively communicate in written and verbal form to both peers and non-experts. - Communicate | Research advancement | A careful review of recent advancements in the field of research | Some review of recent advancements in the field of research | decision-making analysis paper, pose 2 questions to |
| Research results are presented in a systematic way Research results are not presented in a systematic way questions, post a summary of the systematic way Decisions or recommendations are informed by recent advancements in the field Decisions or recommendations are informed by recent advancements in the field • BMI 560 - develop research results are not informed by recent advancements in the field • BMI 561 - develop research question, it review alims, methods, and institutional IRB BWI 560 - develop research question, it review alims, methods, and institutional IRB • BMI 561 write fiel notes based on observations that would be useful to team; analyze qualitative data to produce credible results Lifelong Learning Meets expectations Does not meet expectations Possible Measurement expectations SLO: • Engage in lifelong learning through: finding, interpreting and critically appraising professional literature order to stay informed of advances in their chosen field; and connecting with the larger professional conference and societies. • Includes Thursday research expectations SLO: Conference Presenting art research conference • Possible Measurement expectations SLO: Conference Presenting art research conference • Includes Thursday conference, OHSU research conference SLO: • Engage in lifelong learning through: finding, interpreting and critically appraising professional literature order to stay informed of advances in their c | Research objectives | Coherent approach to understanding research objectives | Incoherent approach to understanding research objectives | students, respond to classmates' comments and |
| Decisions or recommendations recommendations are informed by recent advancements in the field Decisions or recommendations are research proposal including research question, lit review aims, methods, and lay language summary that migh be submitted to an institutional IRB BMI 561write field BMI 561-write field BMI 561-write field Notes field BMI 561-write field BMI 561-write field BMI 561-write field BMI 561-write field Notes field BMI 561-write field BMI 561-write field BMI 561-write field Decisions or expectations Boes not meet expectations Course Finals - Passing other large course projects SLO: - Engage in lifelong learning through: finding, interpreting and critically appraising professional literature order to stay informed of advances in their chosen field, and connecting with the larger professional community through participating in conferences and societies. Conference Presenting at research conference Presenting at research Attending Thursday research conference Passible Measurement expectations - Includes Thursday conference, CMSU SLO:: - Effectively communicate in w | Research results | Research results are presented in a systematic way | Research results are not presented in a systematic way | questions, post a summary of the group discussion. |
| Lifelong Learning Meets expectations Does not meet expectations Possible Measurement expectations SLO: Engage in lifelong learning through: finding, interpreting and critically appraising professional literature order to stay informed of advances in their chosen field; and connecting with the larger professional community through participating in conferences and societies. Conference Presenting at research conference Attending Thursday research conference Communication Meets expectations Does not meet expectations Possible Measurement expectations SLO: 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. | 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 | 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 |
| SLO: Engage in lifelong learning through: finding, interpreting and critically appraising professional literature order to stay informed of advances in their chosen field; and connecting with the larger professional community through participating in conferences and societies. Conference Presenting at research conference Attending Thursday research conference Includes Thursday conference, OHSU research week, etc. Communication Meets expectations Does not meet expectations Possible Measurement SLOs: Effectively communicate in written and verbal form to both peers and non-experts. Ocmmunicate professionally, including during interactions with others, and while giving and receiving feedback. | Lifelong Learning | Meets expectations | Does not meet expectations | Possible Measurements |
| contretence Presenting at research Attending mursuay • Includes mursuay participation conference research conference conference, OHSU research week, etc. Communication Meets expectations Does not meet expectations Possible Measurement 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 chills Writing chills • Meets expectation | SLO: • Engage in lifeld order to stay in community thr | ong learning through: finding, interpr nformed of advances in their chosen ough participating in conferences an Presenting at research | eting and critically appraisin field; and connecting with th d societies. | ng professional literature in he larger professional |
| Communication Meets expectations Does not meet expectations Possible Measurement 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 | participation | conference | research conference | Includes Thursday conference, OHSU research week, etc. |
| 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. | Communication | Meets expectations | Does not meet expectations | Possible Measurements |
| | SLOs: Effectively commu Communicate prof feedback. Writing skills | nicate in written and verbal form to l essionally, including during interactio | both peers and non-experts. ons with others, and while g | iving and receiving |

| | 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 |
|---|---|--|--|
| Speaking skills | Spoken explanations are clear and concise | Spoken explanations are not clear and concise | informatics topic and prepare a |
| Audience awareness | Audience knowledge was considered in presentation of topic | Audience knowledge was not considered in presentation of topic | presentation on the same topic using inclusive language. |
| Response to | Actively listen and respond | Respond inappropriately | Course Midterms |
| feedback | appropriately to feedback | to feedback | Course Finals |
| Integrating feedback | Documents and addresses | Does not document or | Passing other larger |
| | feedback; seek out opportunities | address feedback; does | course projects |
| | for feedback | not seek out | |
| | | feedback | |
| Professionalism and | Meets expectations | Does not meet | Possible Measurements |
| Ethics | | expectations | |
| SLO: | | | |
| • Apply fundamental integrity while max | l knowledge of ethics and implement kimizing the availability of data, infor | t solutions that assure confic mation, and knowledge. | dentiality, security and |
| Academic | Awareness of academic integrity | Lack of awareness of | • BMI 524 |
| integrity/Research | and research ethics | academic integrity and | Conceptualize |
| ethics | | research ethics | analytical reporting |
| Manage data | Record data in prescribed format | Record experimental | needs in a use case |
| | in timely, accurate and complete | results with flaws in | and create 4 |
| | manner | timeliness, accuracy and | visualizations in |
| | | organizations | lableau to support |
| | | | the |
| | | | conceptualization. |
| | | | Identify the |
| | | | consumers/users of |
| | | | the visualizations |
| | | | and create tailored |
| | | | 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 |
| | 1 | 1 | DMLEAA porform |

 BMI 544—perform basic programming in Java or Python to access a MySQL database

| | | | BMI 5465-10 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 576Select one culture/area of diversity your baye |
|--|---|---|---|
| | | | American woman about healthcare issues for Black Americans and potential trust issues. • BMI 576Select |
| | | | 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 product informatics, informatics | uctive member of a multidisciplinary nation technology, clinical, administra | collaborative team of biolog ative, and other experts. | gical or other scientists, |
| Teamwork | Work collegially and effectively | Does not work collegially | Team evaluations, |
| | as team member/collaborator | and effectively as team | feedback from |
| | | | Į |

| SLO: | lada of information colutions that h | ale to oncure actions affet | within volovent clinic-l |
|--------------------|--------------------------------------|-----------------------------|---|
| Improvement | | expectations | |
| Safety and Quality | Meets expectations | Does not meet | Possible Measurements |
| Safety and Quality | Meets expectations | Does not meet | 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 |
| | | | mentor/advisor, other peer, etc. BMI 517, BMI 518 create project plan applying |
| | | | |

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 natients) | | | |
| researchers, and pa 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 | Meets expectations | Does not meet expectations | Possible Measurements |
| Justice and Equiry | | | |
| SLO: Apply principles of soc scholarship. | ial justice, equity, and/or anti-racisr | n through community-enga | ged practice, service, or |
| 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