**OHSU – Biomedical Informatics Graduate Program - Core Competencies for MS Non-Thesis 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 MS Non-Thesis degree program. Measurements are a suggestion – feel free to add as you see fit!

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| **Professional Knowledge and Skills** | **Meets expectations** | **Does not meet expectations** | **Possible Measurements** |
| SLO:   * Apply knowledge of bioinformatics and computational biomedicine, and related disciplines, to solve problems in research, clinical and/or educational settings. | | | |
|  | Good understanding of the knowledge base related to biomedical informatics | Poor knowledge base related to biomedical informatics | * Completed Capstone Project * Completed internship * Possible course alignment: BMI 550, BMI 551, BMI 552 A/B, BMI 553 * Course Midterms * Course Finals * Passing other larger course projects |
| Knowledge base |
| Advancements | A clear understanding of the advancements in biomedical informatics | Lack of understanding of the advancements in biomedical informatics |
| Specialization | Good 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 problem | Inaccurate and inconsistent application of existing knowledge to analyze the research problem |
| **Reasoning and Judgement** | **Meets expectations** | **Does not meet expectations** | **Possible Measurements** |
| SLO:   * Identify and apply appropriate research and methods to analyze, contextualize, interpret results, and evaluate their internal and external validity. | | | |
| Critical thinking | Viewpoints presented in the scientific literature are questioned | Viewpoints presented in the scientific literature are taken as fact, without question | * Completed Capstone Project * Completed Internship * Possible course alignment: BMI 560, BMI 561, BSTA 525 * Course Midterms * Course Finals * Passing other larger course projects |
|  | 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. |
|  | 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 | * Completed Capstone (research paper, manuscript or internship) * Possible course alignment: BMI 552 A/B * Course Midterms * Course Finals * Passing other larger course projects |
| Research advancement | A careful synthesis of recent advancements in the field | Some synthesis of recent advancements in the field |
| Research objectives | Coherent approach to address research objectives | Incoherent approach to address 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, BioData Club, 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 thesis and organization supports the objectives. Content is clear and coherent. | Poorly written and poorly organized, content unclear, lapses in coherence | * Completed Capstone Project * Completed Internship * Possible course alignment: BMI 552 A/B, BMI 570 * Course Midterms * Course Finals * Passing other larger course projects * Pre-defense presentation * Glossary of terms might be present at final presentation defense for non-experts |
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| 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  Example: Integrated feedback from pre-defense meeting to public defense. | 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 | * Completed Capstone Project * Completed Internship * Research rotation * Possible course alignment: BMI 535, BMI 546, BMI 565, BMI 569, BMI 576 * Course Midterms * Course Finals * Passing other larger course projects |
| Manage data | Record data in prescribed format in timely, accurate and complete manner | Record experimental results with flaws in timeliness, accuracy and organizations |
| **Interprofessional 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 | Works 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. * Research rotation * Possible course alignment: BMI 552 A/B, BMI 553, BMI 569 * Course Midterms * Course Finals * Passing other larger course projects |
| **Safety and Quality Improvement** | **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 rotation * Possible course alignment: BMI 576 * Passing other larger course projects |
| **Systems** | **Meets expectations** | **Does not meet expectations** | **Possible Measurements** |
| SLOs:   * Apply the principles of team science to solve complex information problems. * Appraise applicable bioinformatics concepts, methods, and tools to solve challenging problems in their focus area. | | | |
| Team Science | Applies principles of team science | Does not apply principles of team science | * Completed Capstone Project * Completed Internship * Research rotation * Possible course alignment: BMI 546 * Course Midterms * Course Finals * Passing other larger course projects |
| Tools and techniques | Understanding of limitations of existing tools and techniques | No understanding of limitations of existing tools and techniques |
| Awareness of complexity | Awareness of the complexity of scientific problems | Lack of awareness of the complexity of scientific problems |
| **Social Justice** | **Meets expectations** | **Does not meet expectations** | **Possible Measurements** |
| SLO:   * Integrate the culture and diversity of a population when carrying out research and/or professional practice in informatics. | | | |
| Empathy toward others | Demonstrates empathy toward the culture and diversity of all stakeholders | Treats others with respect; follows standard practices | * Completed Capstone Project * Completed Internship * Possible course alignment: BMI 576 * Course Midterms * Course Finals * Passing other larger course projects * Participation in two DMICE cultural diversity activities per year * Includes Thursday conference, OHSU research week, BioData Club, etc. (whether attending or presenting) |

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