CURRICULUM COMMITTEE REPORT

The Curriculum Committee recommends the following courses to the Graduate Board for approval at its October 26th, 2017 meeting.

New Courses:

BMB 502 Introduction to Bioinformatics

Modifications:

NUR 506 Professional Issues in Advanced Nursing Practice

October 10, 2017

To: Curriculum Committee:
Scott Delcourt
Jim Artesani
Grant Miles
Joshua Kelley
Stuart Marrs
Deborah Rollins
Jack Campbell
Qian Xue

Fr: Erin Twitchell, Administrative Specialist

Re: **Curriculum Committee, October 10th, 2017 Stodder Hall, Room #48**

The following courses will be presented on **Tuesday, October 10th at 2:00 p.m**. in the Graduate School's Conference Room, 48 Stodder Hall.

1. 2:15-2:30 BMB 502
   Ben King- Call 207-644-9403

2. 2:30-2:40 NUR 506
   No presentation

OSR: Date 9/18/17 Initial RT
DEPT: G S
STUDENT:
FILE:

THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

Graduate course proposals, modifications, or elimnations must be submitted to the Graduate School no later than the 3rd of each month. Please refer to the Graduate School website for the Curriculum Committee meetings schedule. Electronic signatures and submission is required.

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to erin.twitchell@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT: Molecular and Biomedical Sciences

COURSE DESIGNATOR: BMB COURSE NUMBER: 502 EFFECTIVE SEMESTER: Spring 2018

COURSE TITLE: Introduction to Bioinformatics

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- ☐ New Course
- ☒ New Course with Electronic Learning
- ☐ Experimental

MODIFICATION (Check all that apply and complete Section 2):

- ☐ Designator Change
- ☐ Number Change
- ☐ Title Change
- ☐ Description Change
- ☐ Prerequisite Change
- ☐ Credit Change
- ☒ Cross Listing (must be at least 400-level)[1]
- ☐ Other (specify) _____

ELIMINATION:

- ☐ Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

Robert Gendron 9-6-2017 Robert Gendron

College(s) Curriculum Committee Chair(s) (if applicable)

Erika A Lee 9-18-17

College Dean(s)

Graduate School (sign and date)

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 1 (FOR NEW COURSE PROPOSALS)

Proposed Catalog Description (include designator, number, title, prerequisites, credit hours):

BMB 502, Introduction to Bioinformatics, Course description: A multidisciplinary study of fundamental biological questions through the organization, integration and analysis of increasingly large and complex datasets. Topics include primary data repositories, data integration and curation, sequence analysis methods, functional annotation, high-throughput sequence analysis workflows, statistical analysis of gene expression data, clustering methods and modeling biological networks. Prerequisites: BMB 280 (Introduction to Molecular and Cellular Biology) or instructor's permission, 3 credit hours. BMB 502 cannot be taken for credit consecutively after BMB 402.

Components (type of course/used by Student Records for MaineStreet) – *Multiple selections are possible for courses with multiple non-graded components:*

- ☐ Applied Music
- ☐ Clinical
- ☐ Field Experience/Internship
- ☒ Research
- ☐ Studio
- ☐ Laboratory
- ☒ Lecture/Seminar
- ☐ Recitation
- ☐ Independent Study
- ☐ Thesis

Text(s) planned for use:

Introduction to Bioinformatics by Robert M. Lesk (ISBN 978-0-19-965156-6)

Course instructor (include name, position, teaching load):

Benjamin L. King, Assistant Professor of Bioinformatics. 25% teaching.

Reason for new course:

Modern biomedical, biological, ecological and bioengineering research requires knowledge of how to analyze and integrate increasingly large datasets through bioinformatics. Bioinformatics is a multidisciplinary scientific field that studies fundamental biological questions through the organization, integration and analysis of increasingly large and complex datasets. The course provides a broad introduction to major concepts and applications in bioinformatics.

Does the course addition require additional department or institutional facilities, support and/or resources, e.g. new lab facilities, computer support and services, staffing (including graduate teaching assistants), or library subscriptions and resources?

- ◉ No. The department will not request additional resources for this course.
- ○ Yes. Please list additional resources required and note how they will be funded or supported.

What other departments/programs are affected (e.g. course overlap, prerequisites)? Have affected departments/programs been consulted? Any concerns expressed? Please explain.

None

How often will this course be offered? Will offering this course result in overload salary payments, either through the college or CED, either to the instructor of this course or to anyone else as a result of rearranging teaching assignments?

Once a year (Spring semester)

BMB 402 and BMB 502 Syllabus
Introduction to Bioinformatics

Instructor: Benjamin L. King, Ph.D.

Office: 290 Hitchner Hall

Office hours: By appointment

Telephone: 207-581-2803

E-mail: benjamin.l.king@maine.edu

Course description: A multidisciplinary study of fundamental biological questions through the organization, integration and analysis of increasingly large and complex datasets. Topics include primary data repositories, data integration and curation, sequence analysis methods, functional annotation, high-throughput sequence analysis workflows, statistical analysis of gene expression data, clustering methods and modeling biological networks. BMB 502 cannot both be taken for credit consecutively after BMB 402.

Number of credit hours: 3

Prerequisites: BMB 280 (Introduction to Molecular and Cellular Biology) or instructor's permission.

Course Goals

The primary goal of the course is to provide a broad overview of how bioinformatics is used to advance the study of biological questions through the organization, integration and analysis of datasets. A secondary goal of the course is to obtain practical knowledge on how to begin to apply bioinformatics resources, methods and tools to specific questions in molecular genetics.

The goals for each of the four units in both BMB 402 and BMB 502 are as follows.

1. Describe the scope of major primary data repositories for nucleotide, protein and functional genomic data and how data are represented in those repositories.
2. Explain common data integration methods that have been employed in major bioinformatics resources, such as genome browsers, and curated resources, such as model organism databases.
3. Describe common sequence analysis algorithms and apply them to functionally annotate sequences.
4. Describe and compare common workflows for high-throughput sequence analysis workflows and implement a workflow for gene expression studies conducted using high-throughput RNA sequencing.

An additional goal for BMB 502 is as follows:

1. Critique analysis methods from publication that describes a gene expression dataset.

Course Learning Objectives

At the completion of BMB 402 and BMB 502, students will:

1. Describe the basic principles of bioinformatics that includes the organization, integration and analysis of biological datasets.
2. Define the major primary data sources that have transformed biology into a data-intensive science.
3. Demonstrate working knowledge of a selection of major bioinformatics resources and tools.
4. Describe the basic principles of data integration.
5. Describe basic programming concepts.
6. Describe how to critically evaluate data and analysis results using diagnostic plots and visualization methods.
7. Demonstrate working knowledge of common analysis workflows for high-throughput sequence data.
8. Describe best practices for experimental design of genome-wide gene expression experiments.
9. Demonstrate basic working knowledge of the R statistical computing environment.
10. Describe several commonly used clustering methods.
11. Describe how networks can be used to represent different biological datasets
12. Describe ethical considerations for biomedical datasets.

At the completion of BMB 502, students will also:

13. Contrast the strengths and weaknesses for analysis methods described in a publication that presents a gene expression dataset.

Student Learning Outcomes

By the end of the course, students will be able to:

1. Name the major primary data repositories for:
    a. Nucleotide sequence data
    b. Protein sequence data
    c. Sequence variation data
    d. Functional genomics data
    e. Proteomic data
2. Find genomic, transcript and protein sequences for a gene in multiple organisms.
3. List all characterized sequence variants for a given gene and the allele frequency of each variant in a given population.
4. Provide an example of how accession numbers from one resource may be mapped to another resource.
5. Generate sets of protein sequences with common functions using Gene Ontology annotations.
6. Functionally annotate protein sequences using protein sequence similarity, domains and secondary structure.
7. Provide examples for how data are integrated within a genome browser.
8. List genes annotated within a given region of a genome assembly.
9. Find syntenic regions between genomes. For example, find the syntenic region in the

zebrafish genome for a given chromosomal region in the human genome.
10. Provide examples of curated bioinformatics resources.
11. List phenotypes observed for mutant alleles for mouse and zebrafish genes.
12. List chemicals described to alter the function or expression of a gene.
13. Provide examples for how each of the BLAST programs (blastn, blastx, blastp, tblastn and tblastx) are used.
14. Demonstrate how to use a scoring matrix to evaluate a pairwise sequence alignment.
15. Find primary sequence data (FASTQ) files for a published RNA sequencing dataset.
16. Describe how sequence composition and k-mer content are used to evaluate sequence bias in high-throughput sequence data.
17. Describe normalization techniques commonly used for gene expression data.
18. Describe how diagnostic plots are used to evaluate gene expression data.
19. Describe how heatmaps are used to summarize gene expression profiles and what dendrograms generated by two dimensional hierarchical clustering represent.
20. Explain what nodes and edges represent when gene expression data are visualized as a network.

Instructional Materials and Methods

Textbook title and other required course materials:

Introduction to Bioinformatics by Robert M. Lesk (ISBN 978-0-19-965156-6)

List of references:

Electronic copies (PDFs) of selected papers will be provided through Fogler Library. Included in these papers are the following:

- Gymrek M, McGuire AL, Golan D, Halperin E, Erlich Y. Identifying personal genomes by surname inference. *Science.* 2013 Jan 18;339(6117):321-4. doi:10.1126/science.1229566. PubMed PMID: 23329047.
- Jensen RA, Thompson ME, Jetton TL, Szabo CI, van der Meer R, Helou B, Tronick SR, Page DL, King MC, Holt JT. BRCA1 is secreted and exhibits properties of a granin. Nat Genet. 1996 Mar;12(3):303-8. PubMed PMID: 8589722.
- Koonin EV, Altschul SF, Bork P. BRCA1 protein products ... Functional motifs... Nat Genet. 1996 Jul;13(3):266-8. PubMed PMID: 8673121.
- Styczynski MP, Jensen KL, Rigoutsos I, Stephanopoulos G. BLOSUM62
- miscalculations improve search performance. Nat Biotechnol. 2008 Mar;26(3):274-5. doi: 10.1038/nbt0308-274. PubMed PMID: 18327232.
- Pertea M, Kim D, Pertea GM, Leek JT, Salzberg SL. Transcript-level expression analysis of RNA-seq experiments with HISAT, StringTie and Ballgown. *Nat Protoc.* 2016 Sep;11(9):1650-67. doi: 10.1038/nprot.2016.095. PubMed PMID: 27560171; PubMed Central PMCID: PMC5032908.
- Anders S, McCarthy DJ, Chen Y, Okoniewski M, Smyth GK, Huber W, Robinson MD. Count-based differential expression analysis of RNA sequencing data using R and Bioconductor. Nat Protoc. 2013 Sep;8(9):1765-86. doi: 10.1038/nprot.2013.099. PubMed PMID: 23975260.

Required technology:

1. Blackboard – all students must have access to and use Blackboard.
2. Top Hat (classroom tool) – https://tophat.com
3. Laptop computer with the following **free** software installed:
   a. Current version of a web browser
   b. Current version of the R statistical computing environment
   c. Current version of R Studio
   d. Plain text editor: TextWrangler (Mac) or Sublime Text (Windows)

Tentative Schedule (Dates for Spring 2018)

Date	Topics	Learning activities	Assignments	Unit Activities & Project
Week 1, Jan. 22	Course Introduction **Unit 1**: Overview of bioinformatics • Need • Scope • Data sharing • Controlled vocabularies • Data integration • Ethical considerations of data sharing	Gymrek *et al. Science* (2013) paper	Assignment 1: Summarize Gymrek *et al. Science* (2013) paper	
Week 2, Jan. 29	**Unit 1**: Primary data types: "omics" approaches to characterize biological systems • Genomics • Transcriptomics • Epigenetics • Proteomics • Metabolomics	readings	Assignment 2: The ENCODE Project	**Feb. 2 – Assignment 1 Due**
Week 3, Feb. 5	**Unit 1**: Primary data repositories • Sequence • Sequence variation • Protein structure • Identifiable human genomic data Functional annotation • Nomenclature • Gene Ontology	readings	Unit 1 Take Home Exam	**Feb. 9 - Assignment 2 Due**

Week 4. Feb. 12	**Unit 2:** Data Integration • Genome browsers • UCSC Genome Browser • Ensembl	readings	Assignment 3: Hunting for genes in UCSC and Ensembl	**Feb. 12 - Unit 1 Take Home Exam Due**
Week 5. Feb. 19	**Unit 2:** Curated data integration • Model organism databases • Mouse Genome Informatics (MGI) • Zebrafish Information Network (ZFIN)	readings	Assignment 4: Compare mouse and zebrafish mutant phenotypes	**Feb. 23 – Assignment 3 Due**
Week 6. Feb. 26	**Unit 2:** Curated data integration • Comparative Toxicogenomics Database	readings	Unit 2 Take Home Exam	**Mar. 2 – Assignment 4 Due**
Week 7. Mar. 5	**Unit 2:** Leveraging data integration • Genome-wide analysis (BioMart) • Gene interactions (STRING)	readings	Unit 2 Take Home Exam	**Mar. 9 – Unit 2 Take Home Exam Due** **Mar. 9 - Term project concept due**
Week 8. Mar. 12	Spring Break		Term project outline (due Mar. 9)	
Week 9. Mar. 19	**Unit 3:** Introduction to data modelling • Example: Integrate gene expression datasets	readings	Assignment 5: Diagram how to model sequence variation data	**Mar. 23 - Term project outline due**
Week 10. Mar. 26	**Unit 3:** Sequence alignment methods • Local, global • Pairwise, multiple • BLAST, BLAT • Repeatmasking **Unit 3:** High-throughput sequence analysis workflows • Sequence variation	readings	Assignment 6: Sequence similarity searching	**Mar. 30 – Assignment 5 Due**
Week 11. Apr. 2	**Unit 3:** High-throughput sequence analysis workflows • RNA sequencing	readings	Unit 3 Take Home Exam	**Apr. 6 - Assignment 6 Due**

Week 12. Apr. 9	**Unit 4**: Introduction to R statistical computing environment • Scripts • Variables • Data structures • Common operations • Plotting	readings	Assignment 7: Basic R plotting script	**Apr. 9 – Unit 3 Take Home Exam Due**
Week 13. Apr. 16	**Unit 4**: RNA-Seq data analysis in R • Diagnostic analysis • Statistical modeling • Differential expression testing • Multiple testing adjustment • Data visualization	readings	Critique Assignment: Write critique of published gene expression study.	Apr. 20 – **Assignment 7 Due**
Week 14. Apr. 23	**Unit 4**: Clustering methods with application to RNA-Seq data • Hierarchical clustering • k-means • Principle Component Analysis • Support Vector Machines	readings	Unit 4 Take Home Exam	Apr. 27 – **BMB 402: Assignment 8** **BMB 502: Critique Assignment Due**
Week 15. Apr. 30	**Unit 4**: Biological networks with application to RNA-Seq data • Correlation • Adjacency matrix • Data visualization	readings	Unit 4 Take Home Exam	**May 4 – Unit 4 Take Home Exam Due** **May 4 – Term project due**

6. Grading and Course Expectations

Components of the final course grade for BMB 402:

Requirement	% Grade
Participation	5
Assignments	30 (8 assignments @ 3.75% each)
Exams	40 (4 exams @ 10% each)
Term Project	25
Total	**100**

Components of the final course grade for BMB 502:

Requirement	% Grade
Participation	5
Assignments	20 (7 assignments @ 2.86% each)
Critique Assignment	10
Exams	40 (4 exams @ 10% each)
Term Project	25
Total	**100**

Tentative exam schedule:

1. Unit 1: Beginning of week 4 (Feb. 12)
2. Unit 2: End of week 7 (Mar. 9)
3. Unit 3: Beginning of week 12 (Apr. 9)
4. Unit 4: End of week 15 (May 4)

Letter grading is determine using the following range.

A = 93 - 100	B- = 80 - 82	D+ = 67 - 69
A- = 90 - 92	C+ = 77 - 79	D = 63 - 66
B+ = 87 - 89	C = 73 - 76	D- = 60 - 62
B = 83 - 86	C- = 70 - 72	F = below 60

Participation

Participation is required and accounts for 5% of your final grade. Excused absences are only permitted with prior notification to the instructor and official documentation. Participation will be graded using quizzes held during class. Half of the grade for each quiz is based on correct answers and half based on completing the quiz.

Assignments and Exams

All four units of the course have one or more assignments and a take home exam. The assignments will require students to write short summary of a paper, answer questions or

complete specific activities. Students will need to integrate new and past knowledge and then apply it to new problems or questions. Working in groups on assignments are encouraged. Take home exams are to be completed individually. All assignments and take home exams are to be submitted through Blackboard.

Term Project

Students are required to complete a term project on a bioinformatics topic that will be summarized in a written report. Each student must submit a one paragraph project proposal by the end of week 7. This proposal will be reviewed by the instructor. The instructor may require the student to refine or redirect their topic so that the scope is appropriate. The project may be on a variety of topics relevant to the course and may include an analysis component. Term projects will be graded based on the depth and level of critical and independent thinking demonstrated in the report.

Course Policies

- Attendance and class participation are required and a major component of your grade.
- Grades for late submissions of assignments will be penalized by 10% for each day the assignment is late.
- Late submissions of exams or term projects will not be accepted and assigned a score of 0.
- Extra credit assignments are not available.
- Incomplete work will be graded based on the portion that has been completed.
- Final date for all work to be in, unless other arrangements have been made with instructor is 5pm Friday of the last week of scheduled classes for semester.

Academic Honesty

Academic honesty is very important. It is dishonest to cheat on exams, to copy term papers, to submit papers written by another person, to fake experimental results, or to copy or reword parts of books or articles into your own papers without appropriately citing the source. Students committing or aiding in any of these violations may be given failing grades for an assignment or for an entire course, at the discretion of the instructor. In addition to any academic action taken by an instructor, these violations are also subject to action under the University of Maine Student Conduct Code. The maximum possible sanction under the student conduct code is dismissal from the University.

Students with Disabilities Statement

If you have a disability for which you may be requesting an accommodation, please contact Student Accessibility Services, 121 East Annex, 581.2319, as early as possible in the term. *Students who have already been approved for accommodations by SAS and have a current accommodation letter should meet with Dr. Benjamin King privately as soon as possible.*

Course Schedule Disclaimer (Disruption Clause)

In the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within its programmed time frame. In that event, you will be provided an addendum to the syllabus that will supersede this version.

Sexual Violence Policy

Sexual Discrimination Reporting
The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, **your teacher is required to report** this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

Why do teachers have to report sexual discrimination?
The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one victim reports having been assaulted or harassed by the same individual.

What will happen to a student if a teacher reports?
An employee from the Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

> For *confidential resources on campus*: **Counseling Center: 207-581-1392** or **Cutler Health Center: at 207-581-4000.**
> For *confidential resources off campus*: **Rape Response Services:** 1-800-310-0000 or **Spruce Run**: 1-800-863-9909.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

~~For *support services on campus*:~~ **~~Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911.~~** Or see the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/

RECEIVED
OCT 05 2017
GRADUATE SCHOOL

THE UNIVERSITY OF MAINE

NEW COURSE PROPOSAL/MODIFICATION/ELIMINATION FORM FOR GRADUATE COURSES

Graduate course proposals, modifications, or eliminations must be submitted to the Graduate School no later than the 3rd of each month. Please refer to the Graduate School website for the Curriculum Committee meetings schedule. Electronic signatures and submission is required.

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to erin.twitchell@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

GRADUATE PROGRAM/UNIT: School of Nursing

COURSE DESIGNATOR: NUR COURSE NUMBER: 506 EFFECTIVE SEMESTER: Spring 2018

COURSE TITLE: Professional Issues in Advanced Practice Nursing

REQUESTED ACTION

NEW COURSE (check all that apply, complete Section 1, and submit a complete syllabus):

- ☐ New Course
- ☐ New Course with Electronic Learning
- ☐ Experimental

MODIFICATION (Check all that apply and complete Section 2):

- ☐ Designator Change
- ☐ Number Change
- ☐ Title Change
- ☒ Description Change
- ☐ Prerequisite Change
- ☐ Credit Change
- ☐ Cross Listing (must be at least 400-level)[1]
- ☐ Other (specify) _____

ELIMINATION:

- ☐ Course Elimination

ENDORSEMENTS

Please sign using electronic signatures. If you do not already have a digital signature, please click within the correct box below and follow the on-screen instructions.

Leader, Initiating Department/Unit(s)

College(s) Curriculum Committee Chair(s) (if applicable)

College Dean(s)

Graduate School (sign and date)

1. Courses cross-listed below 400-level require the permission of the Graduate School.

SECTION 2 (FOR COURSE MODIFICATIONS)

Current catalog description (include designator, number, title, prerequisites, credit hours):

NUR 506, Professional Issues in Advanced Practice Nursing
Professional issues of advanced practice nurses including role development, legal and business aspects of practice and strategies to insure high quality of health care practice.
Prerequisite: NUR 522, Cr. 2

***Proposed* catalog description (include designator, number, title, prerequisites, credit hours):**

NUR 506, Professional Issues in Advanced Practice Nursing
Issues of advanced practice nursing, including professional role transition; ethical, legal and business aspects of practice; leadership domains of advanced practice nursing; and strategies to enhance the quality of care and health care outcomes will be addressed. Prerequisite: NUR 522, Cr. 2

Reason for course modification:

SECTION 3 FOR COURSE ELIMINATIONS

Reason for Elimination

Please return the completed e-form with appropriate signatures and documentation to the Graduate School by saving the form to your desktop and sending as an attachment to erin.twitchell@maine.edu. Please include in the subject line 'Course Proposal' and the course designator and number.

To: Curriculum Committee
Graduate School

University of Maine School of Nursing
NUR 506: Professional Issues in Advanced Practice Nursing

The modification to NUR 506 was prompted by the changes implemented by the National Organization of Nurse Practitioner Faculty. This organization provides curriculum guidelines for Schools of Nursing

The two content areas specific to the modifications are described below.
Nurse Practitioner Core Competencies Curriculum Content

Ethics
1.Integrates ethical principles in decision-making.
2.Evaluates the ethical consequences of decisions.
3. Applies ethically sound solutions to complex issues related to individuals, populations and systems of care

Leadership
1. Assumes complex and advanced leadership roles to initiate and guide change.
2. Provides leadership to foster collaboration with multiple stakeholders.
3. Demonstrates leadership that uses critical and reflective thinking.