Core Course Assessment Plan, 2019-20
Element 2: Mathematics

Please complete all sections; do not delete section information. Submit to Pilot when complete.

SECTION 1: GENERAL INFORMATION

Course Dept. Prefix: MTH Course #: 2240_____

Semester when assessment will occur: ☐Spring ☐ Summer x☐ Fall Year:2019 or 2020

Course Title: Applied Calculus_____

Section Types and number of sections offered in 2019-20. Complete all that apply.

_X___ Dayton face-to-face	_____ Lake face-to-face
_____ Dayton online	_____ Lake online
_____ Dayton Honors	_____ Lake Honors

Attributes: ____ Integrative Writing in Core
____ Multicultural Competency in Core
____ Service Learning in Core

Dept. Core Assessment Lead: ____Mindy Diesslin_____ Mindy.Diesslin@wright.edu_____
Name email

List at least twoassessors; this may include course instructor only if there are multiple sections and multiple instructors of the course. Note - The instructor may not assess his/her students' papers.

- Karen Brackenridge_____
- Mindy Diesslin_____
- Cathryn Curry_____
- Marj Hess – Lake Campus_____

SECTION 2: ASSESSMENT PLAN

It is preferable to have the assessment plan for all sections of a course. If not feasible, please complete an assessment plan for separate sections.

Course Outcomes._____ Check here if Outcomes have been modified.

The course must address all 5 outcomes but must assess a minimum of 1 outcome. Highlight in yellow the outcome(s) you will assess. If you have modified the outcomes, please insert here in place of standard outcomes.

1. Identify the various elements of a mathematical or statistical model;
2. Determine the values of specific components of a mathematical/statistical model or relationships among various components;
3. Apply a mathematical/statistical model to a real-world problem;
4. Interpret and draw conclusions from graphical, tabular, and other numerical or statistical representations of data; and
5. Summarize and justify analyses of mathematical/statistical models for problems, expressing solutions using an appropriate combination of words, symbols, tables or graphs.

Assignments. Select **one** of the options below for assessment of one or more outcomes

☐ Written assignment(s) that addresses/address outcome(s). Include outcome #, title and description for each assignment.

Outcome #: _____ Title:

Description of assignment:

X☐Essay question(s). Provide the question(s) and outcome(s) below.

1. Outcome #:_3_____ Essay Question: A study conducted on a patient undergoing cardiac catheterization indicated that the diameter of the aorta was approximately D millimeters when the aortic pressure was p (mm of mercury), where $D(p) = -0.0009p^2 + 0.13p + 17.81$, for $50 \leq p \leq 120$.
   A) Find the rate of change of diameter with respect to pressure when the pressure is 60 mm.
   B) Use calculus to find the absolute maximum diameter and state at which value of pressure it occurs. Remember to check critical points if they are within the domain.
2. Outcome #: _____ Essay Question: _____
3. Outcome #: _____ Essay Question: _____

☐Pilot asynchronous written discussion that addresses outcome(s). Provide the outcome # and question(s).

1. Outcome #: _____Discussion Question: _____
2. Outcome #: _____ Discussion Question: _____
3. Outcome #: _____Discussion Question: _____

☐ Multiple Choice or T/F Marker questions – 3 to 4 questions per outcome. List the outcome and question numbers. A rubric is not used for Marker questions. "All the above" should not be used as the correct answer more than once. **Courses that are IW or SRV/SRVI must use written assignments for those attributes**. Complete the benchmark: We expect _____% of students to answer ____% of the question(s) correctly.

1. Outcome #: _____
   a) Question: _____
   b) Question: _____
   c) Question: _____
   d) Question: _____
2. Outcome #: _____
   a) Question: _____
   b) Question: _____
   c) Question: _____
   d) Question: _____
3. Outcome #: _____
   a) Question: _____
   b) Question: _____
   c) Question: _____
   d) Question: _____

Collecting and submitting the student assignment(s)

____ Will upload assignment(s) to Pilot _____ Will give access to assignment(s)on Pilot

Other: will make copies of the students' final exam answers and scan in a subset of these final exam questions to submit to Lake Campus for evaluation there by Marj Hess

Rubric Selection (A, B). Select the items you feel best matchyour assignment(s) in the rubric(s) on the next pages. Please highlight in yellow. **If this course has an IW attribute, please also see section B.**

A. Element 2 Rubric.Select the item(s) you willuse in your rubric by highlighting in yellow the item(s). You may select one or more of them. As there is overlap, **choose the items that best fit the assignment you select for assessment.**The items below are taken from the Association of American Colleges and Universities (AACU) Value Rubrics for Math Literacy.

IF YOU ARE USING MARKER QUESTIONS FOR THE OUTCOME, DO NOT USE THIS RUBRIC.

	Capstone **4**	**Milestones** **3**	 **2**	**Benchmark** **1**
Interpretation ***Abilitytoexplaininformationpresentedinmathematicalforms(e.g.,equations,graphs,diagrams,tables,words)***	Providesaccurateexplanationsoffinformationpresentedinmathematicalforms.Makesappropriateinferencesbasedonthatinformation.*Forexample,accuratelyexplainsthetrenddatashowninagraphandmakesreasonablepredictionsregardingwhatthedatasuggestaboutfutureevents.*	Providesaccurateexplanationsofinformationpresentedinmathematicalforms.*Forinstance,accuratelyexplainsthetrenddatashowninagraph.*	Providessomewhataccurateexplanationsofinformationpresentedinmathematicalforms,butoccasionallymakesminorerrorsrelatedtocomputationsorunits.*Forinstance,accuratelyexplainstrenddatashowninagraph,butmaymiscalculatetheslopeofthetrendline.*	Attemptstoexplaininformationpresentedinmathematicalforms,butdrawsincorrectconclusionsaboutwhattheinformationmeans.*Forexample,attemptstoexplainthetrenddatashowninagraph,butwillfrequentlymisinterpretthenatureofthattrend,perhapsbyconfusingpositiveandnegativetrends.*
Representation ***Abilitytoconvertrelevantinformationintovariousmathematicalforms(e.g.,equations,graphs,diagrams,tables,words)***	Skillfullyconvertsrelevantinformationintoaninsightfulmathematicalportrayalinawaythatcontributestoafurtherordeeperunderstanding.	Competentlyconvertsrelevantinformationintoanappropriateanddesiredmathematicalportrayal.	Completesconversionofinformationbutresultingmathematicalportrayalisonlypartiallyappropriateoraccurate.	Completesconversionofinformationbutresultingmathematicalportrayalisinappropriateorinaccurate.
Calculation	Calculationsattemptedareessentiallyallsuccessfulandsufficientlycomprehensivetosolvetheproblem.Calculationsarealsopresentedelegantly(clearly,concisely,etc.)	Calculationsattemptedareessentiallyallsuccessfulandsufficientlycomprehensivetosolvetheproblem.	Calculationsattemptedareeitherunsuccessfulorrepresentonlyaportionofthecalculationsrequiredtocomprehensivelysolvetheproblem.	Calculationsareattemptedbutarebothunsuccessfulandarenotcomprehensive.

	Capstone 4	Milestones 3	2	Benchmark 1
Application/Analysis ***Abilitytomakejudgmentsanddrawappropriateconclusionsbasedonthequantitativeanalysisofdata,whilerecognizingthelimitsofthisanalysis***	Usesthequantitativeanalysisofdataasthebasisfordeepandthoughtfuljudgments,drawinginsightful,carefullyqualifiedconclusionsfromthiswork.	Usesthequantitativeanalysisofdataasthebasisforcompetentjudgments,drawingreasonableandappropriatelyqualifiedconclusionsfromthiswork.	Usesthequantitativeanalysisofdataasthebasisforworkmanlike(withoutinspirationornuance,ordinary)judgments,drawingplausibleconclusionsfromthiswork.	Usesthequantitativeanalysisofdataasthebasisfortentative,basicjudgments,althoughishesitantoruncertainaboutdrawingconclusionsfromthiswork.
Assumptions ***Abilitytomakeandevaluateimportantassumptionsinestimation,modeling,anddataanalysis***	Explicitlydescribesassumptionsandprovidescompellingrationaleforwhyeachassumptionisappropriate.Showsawarenessthatconfidenceinfinalconclusionsislimitedbytheaccuracyoftheassumptions.	Explicitlydescribesassumptionsandprovidescompellingrationaleforwhyassumptionsareappropriate.	Explicitlydescribesassumptions.	Attemptstodescribeassumptions.
Communication ***Expressingquantitativeevidenceinsupportoftheargumentorpurposeofthework(intermsofwhatevidenceisusedandhowitisformatted,presented,andcontextualized)***	Usesquantitativeinformationinconnectionwiththeargumentorpurposeofthework,presentsitinaneffectiveformat,andexplicatesitwithconsistentlyhighquality.	Usesquantitativeinformationinconnectionwiththeargumentorpurposeofthework,thoughdatamaybepresentedinalessthancompletelyeffectiveformatorsomepartsoftheexplicationmaybeuneven.	Usesquantitativeinformation,butdoesnoteffectivelyconnectittotheargumentorpurposeofthework.	Presentsanargumentforwhichquantitativeevidenceispertinent,butdoesnotprovideadequateexplicitnumericalsupport.(Mayusequasi-quantitativewordssuchas"many," "few,""increasing,""small,"andthelikeinplaceofactualquantities.)

B. If this is an IW course, you will use the items on this page. You may select one or more of them. Please highlight in yellow.

Item	Mastery 4	Partial Mastery 3	Progressing 2	Emerging 1
Includes considerations of audience, purpose, and the circumstances surrounding the writing task(s).	Demonstrates a thorough understanding of context, audience, and purpose that is responsive to the assigned task(s) and focuses all elements of the work.	Demonstrates adequate consideration of context, audience, and purpose and a clear focus on the assigned task(s) (e.g., the task aligns with audience, purpose, and context).	Demonstrates awareness of context, audience, purpose, and to the assigned tasks(s) (e.g., begins to show awareness of audience's perceptions and assumptions).	Demonstrates minimal attention to context, audience, purpose, and to the assigned tasks(s) (e.g., expectation of instructor or self as audience).
Content Development	Uses appropriate, relevant, and compelling content to illustrate mastery of the subject, conveying the writer's understanding, and shaping the whole work.	Uses appropriate, relevant, and compelling content to explore ideas within the context of the discipline and shape the whole work.	Uses appropriate and relevant content to develop and explore ideas through most of the work.	Uses appropriate and relevant content to develop simple ideas in some parts of the work.
Formal and informal rules inherent in the expectations for writing in particular forms and/or academic fields (please see glossary).	Demonstrates detailed attention to and successful execution of a wide range of conventions particular to a specific discipline and/or writing task (s) including organization, content, presentation, formatting, and stylistic choices	Demonstrates consistent use of important conventions particular to a specific discipline and/or writing task(s), including organization, content, presentation, and stylistic choices	Follows expectations appropriate to a specific discipline and/or writing task(s) for basic organization, content, and presentation	Attempts to use a consistent system for basic organization and presentation.
Sources and Evidence	Demonstrates skillful use of high-quality, credible, relevant sources to develop ideas that are appropriate for the discipline and genre of the writing	Demonstrates consistent use of credible, relevant sources to support ideas that are situated within the discipline and genre of the writing.	Demonstrates an attempt to use credible and/or relevant sources to support ideas that are appropriate for the discipline and genre of the writing.	Demonstrates an attempt to use sources to support ideas in the writing.
Control of Syntax and Mechanics	Uses graceful language that skillfully communicates meaning to readers with clarity and fluency, and is virtually error-free.	Uses straightforward language that generally conveys meaning to readers. The language in the portfolio has few errors.	Uses language that generally conveys meaning to readers with clarity, although writing may include some errors.	Uses language that sometimes impedes meaning because of errors in usage.

Faculty Senate CORE Oversight Committee

Assessment Plan Review

Element: 2

Course: MTH 2240

Review 1

Item	Complete / NA / Revision Requested	Comments
Learning Outcomes for Element 2 Mathematics	**Complete**	
Assignments matched to Element 2 LOs	**Revision Requested**	**Under "Collecting and submitting the student assignments (bottom of p. 2 and top of p. 3)", Add to "Other: will make copies of the students' final exams" "before the exams are graded". Also add, "Student workers will copy the assignment before any grading begins and scan a separate pdf of every students' assignment. The student worker will then create a zip file of the separate, ungraded exams to be sent to Carl Brun for entry into Aqua Watermark".**
Rubric for LOs	**Complete**	
Rubric for IW Attribute	**N/A**	
Assigned Approved Reviewers	**Complete**	
Other	**Revision Requested**	**On Page 1, Courses must be assessed in 2019-2020 academic year; Fall 2020 is not within that range.**

Review Status: Revision Requested

Committee Chair Signature _____MH:bfn_____ Date ____5/1/2019_____

The next section is for the University Core Oversight Committee (UCOC) Review only.

UCOC Review

Item	Complete/NA	Revision Requested	Comments
Learning Outcomes for Global Traditions	**XX**		
Rubric for LOs	**XX**		
Rubric for MC Attribute	**N/A**		
Rubric for IW Attribute	**XX**		
Rubric for SRV/SRVI Attribute	**N/A**		
Assigned Departmental Reviewers	**XX**		

Committee Review Completed XX

Committee Chair Signature _____ Date __12/2019_____

Note: Report Template will be added to each of the individualized assessment plans to facilitate having one final document (assessment and report) for each course.

SECTION 4: ASSESSMENT REPORT DUE May 7, 2021

A separate report needs to be submitted for each assessment plan approved by the Undergraduate Core Oversight Committee (UCOC).

Please upload this entire document to the Pilot course called Element 5 Core Course Assessment 2020-21 (continuous year) by Friday, May 7, 2021. The Final Report Dropbox link can be accessed via Content > Dropbox (Plans, Reports) > Final Report Dropbox.

Date Report Submitted: 1/31/22

Element: Core Element 2 – Mathematics or Core Element 6 – Natural Science

Academic Year: Element 6 – 2018 to 2019 Element 2 – 2021 to 2022 (adjust dates based on data collection).

Course and Sections Assessed:

Describe the final assessment plan that was implemented and explain any changes made to the approved plan.

See assessment plan documents (assessmentplan2240updated.docx and assessmentplandetails.docx). The only changes made were the removal of faculty members' names who are no longer assessors and the years.

I. Core Learning Outcomes Assessed (list):

Apply a mathematical/statistical model to a real-world problem.

II. Procedures Used for Assessment

For **each** learning outcome addressed by this report, state where and when data were collected (in a course, exam, or performance) and how they were evaluated (e.g. rubric, rating scale, key questions from exams, etc.). Specify the course or courses where students demonstrated the outcomes (if applicable) and the assignment(s) that you used for assessment purposes (e.g., capstone project, final examination, research paper, student presentation, performance, portfolio, etc.).

Dr. Qun Li taught 3 sections of MTH 2240 during fall semester 2021. She put a question on the final exam (previously approved in the assessment plan) and randomly selected 10 final exams from those turned in from each class (since there are approximately 20 students in each section). Dr. Li copied only the page of the exam with the assessment question prior to grading it, randomly selected 15 pages of those copied, and uploaded those to Marj Hess from Lake Campus. The remaining 15 copies were uploaded to Karen Brackenridge at the Dayton campus. Marj and Karen graded their sets of papers using the given rubric on the assessment plan (scores from 1 to 4 for both "representation" and "calculation").

III. Summary of Assessment Results:

What did you find from your assessments? (Present and analyze the results from the Aqua system analysis by Vice Provost Tammy Kahrig and/or your departmental review of marker questions.) What did your data reveal about how well students are achieving the Core Learning Outcomes that you listed above? After analyzing your data, present a summary of the data, clearly indicating what any numbers represent (e.g. percentages? means? medians?). Please number each corresponding assessment, summary, and analysis.

The results show a slightly lower mean and median for the calculation than for the representation. Karen and Marj's results of the randomly selected papers showed similar findings between the graders. A very small proportion of students scored at the benchmark score of 1 (2/30 for representation and 5/30 for calculation). Data was collected from about half of the overall population. It appears the learning outcome is being achieved very well in the two categories.

Representation scores: 3,3,4,3,1,2,4,2,3,4,4,4,2,4,3 (Marj) 4,3,4,1,2,3,4,2,3,2,2,3,4,2,2 (Karen)
Calculation scores: 2,2,4,2,1,1,3,2,3,3,3,3,1,2,2 (Marj) 4,2,4,1,1,3,4,2,4,2,3,2,4,2,2 (Karen)

Representation: mean = 87/30 = 2.9, median = 3.0
Calculation: mean=74/30 = 2.5, median = 2.0

Benchmark Met x☐ Yes or ☐ No
If not met, please identify conditions (if any) that may have impacted these findings.

IV. ACTIONS TAKEN/PLANNED TO IMPROVE STUDENT LEARNING

Describe how you shared the results with instructors of the courses, the department curriculum committee and chair, Lake campus, and other stakeholders. Explain briefly how department faculty will make improvements based upon the assessment findings (e.g. plans to gather more information; recommending changes to the learning outcomes or assessment procedures; changes in course content, instructional approaches, technology, order of course offerings, materials, resources, assignments, policies, funding, advising, planning, training for adjuncts, etc.).

Summary results will be shared through e-mail with department members at both campuses. In order to improve student learning, it would be good to assess the course again and compare those results with the fall 2021 results after suggestions are made, especially with regard to calculation. It was observed that many times calculations were incorrect or incomplete in order to solve the problem, so more emphasis should be placed on the writing of mathematics and the attention to detail in the question. Representation was very good in most cases, and it should always be at the forefront in the instructor's mind to make as many connections as possible between how to represent the situation and what the calculations then mean, both algebraically and graphically.

V. Assessment Administration Feedback

The assessment of the courses was part of the Core assessment cycle. The assessment plan was reviewed and approved by the UCOC. The UCOC provided a presentation on tools available to assist with the assessment, including Watermark Aqua.

Please describe any changes you recommend about the oversight of the assessment process by the UCOC and the Academic Affairs office.

None recommended at this time

UCOC Report Review

Item	Complete/NA	Revision Requested	Comments
Identified Outcome Assessed	**XX**		
Identified Procedure for Assessment	**XX**		
Summary of Results	**XX**		
Results Shared with Instructor, Dept Curriculum Committee, etc.	**XX**		
Plan for Improvements	**XX**		

Committee Review Completed XXX

Committee Chair Signature ___ Dr. Anna M. Bowling _____ Date __2/17/2023_____