

Course Outcomes Guide (COG)

Course Title: MAT 204, Calculus II

Date: Fall 2018

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Expected Learning Outcomes

Course Outcomes:

In this course students will acquire:

- 1) **TECHNICAL COMPETENCY** in the methods of calculus that will enable them to apply the various techniques of integration to evaluate indefinite, definite and improper integrals, and determine arc length, surface area and volume, as well as apply calculus to parametric and polar coordinate equations. Students will be able to apply a variety of tests to determine convergence/divergence of sequences and series. Students will also be able to represent functions by power series, determine intervals of convergence, and provide estimates of error. (*Supports Mathematics Program Outcomes 1, 2, 4 and 5*)
- 2) **CONCEPTUAL UNDERSTANDING** of the formulas, techniques and theory that are developed. Conceptual understanding will be reinforced from numeric, geometric, algebraic and written/verbal perspectives (**The Rule of Four**). Students will be required to provide heuristic and visual justification of important results. (*Supports Mathematics Program Outcomes 1, 2, 4, 5, 6 and 7*)
- 3) **UTILITY** in the methods of calculus. Students will use calculus to solve applied problems from a variety of disciplines ranging from biology, economics, business, engineering, and the social sciences, but primarily focusing on applications from physics and mathematics. (*Supports Mathematics Program Outcomes 1, 2, 4, 5, 6 and 7*)

Assessment (How do or will students demonstrate achievement of each outcome? Please attach a copy of your assessment electronically.)

Students demonstrate achievement of each outcome by scores on problems from AP Calculus BC exams that are correlated to the learning outcomes.

Validation (What methods have you used or will you use to validate your assessment?)

The mean score for HCC students for each problem is compared to the mean score of the AP Calculus BC test examinees. The comparison is reasonable since AP scores are used to determine college credit.

Results (What do your assessment data show? If you have not yet assessed student achievement of your learning outcomes, when is assessment planned?)

Math 204-01 Fall 2018

Assessment Question	1	2	3	4	5
Learning Outcome	1, 3	2, 3	2, 3	2	1, 3
HCC Mean	3.33	0.20	0.53	0.73	3.20
AP Mean	5.51	0.30	0.56	0.75	4.75
HCC Mean minus AP Mean	-2.18	-0.10	-0.03	-0.02	-1.55

The results indicate that HCC Math 204-01 students were, in general, below average in ability to achieve learning outcomes, as compared to AP Calculus BC test examinees. This is in contrast to previous fall Math 204 classes, especially compared to Fall 2016, but consistent with the Fall 2017 class, which was also below average, but not as egregiously below average in questions 1 and 5. The text for Math 204 was changed to an open source text in Spring 2018. The below average scores may then be partly attributed to the text and to types of exercises in the text, which may not prepare students for AP type questions. However, of greater concern is the lack of motivation of the Fall 2018 students, a significant percent of which dropped the class.

Follow-up (How have you used or how will you use the data to improve student learning?)

The results indicate that more practice with utility problems that apply arc length formulas to calculate perimeter and revolution formulas to calculate volume would be beneficial to the students.

Budget Justification (What resources are necessary to improve student learning?)

Staff in the Learning Support Center able to conduct formal study groups in Math 204 students.

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SLOA Data

	SU 2010	FA 2010	SP 2011	SU 2011	FA 2011	SP 2012	SU 2012	FA 2012	SP 2013	FA 2013	SP 2014
# Active students	5	5	30	9	19	20	11	9	27	16	42
%W	0	20	0	0	5.3	10	0	11.1	4.5	0	4.8
*% walk-away Fs No final exam/grade = F										6.3	4.8
% Success (A,B,C)	80	80	100	77.8	56.3	90	80	42.9	90	75	59.5
Common Comprehensive Final Exam Score			72	71	69	67	72	52	49	**	**
Mean course	2.6	3.25	3.76	2.33	2.07	3.36				2.5	1.93

grade											
Item Analysis Weakest Content Areas			SLO 3	SLO 3	SLO 3	SLO 3	None	SLO 1, 2 & 3	SLO 1, 2 & 3	SLO 1 & 3	SLO 1 & 3

*% Walk-away Fs = Did not take the final exam and received a grade of F.

** Common Comprehensive Component of the Final Exam provided and analyzed on the COG.

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SLOA Data

	FA 2013	SP 2014	FA 2014	SP 2015	FA 2015	SP 2016	FA 2016	SP 2017	FA 2017	SP 2018	FA 2018
# Active students	16	42	22	42	25	35	25	31	35	35	25
%W	0	4.8	18.2	7.1	16.0	8.6	4	6.5	20	5.7	32
*% walk-away Fs No final exam/grade = F	6.3	4.8	13.6	11.3	8.0	11.4	0	3.2	2.9	2.9	12
% Success (A,B,C)	75	59.5	50	54.8	48.0	65.7	60	83.9	45.7	74.3	44
Common Comprehensive Final Exam Score	**	**	**	**	**	**	**	**	**	**	**
Mean course grade	2.5	1.93	2.17	1.92	1.64	2.14	2.21	2.76	2.00	2.61	2.18
Item Analysis Weakest Content Areas	SLO 1 & 3	SLO 1 & 3	none	SLO 1 & 3	SLO 1,3	SLO 1,2,3	SLO 1,3	SLO 1,3	SLO 1,2,3	SLO 3	SLO 1, 3

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