LOCALLY DEVELOPED COURSE OUTLINE

Calculus (AP)35-5

Submitted By:

Red Deer Catholic Regional Division No. 39

Submitted On:

May. 16, 2016

Course Basic Information

Outline Number	Hours	Start Date	End Date	Development Type	Proposal Type	Grades
35-5	125.00	09/01/2016	08/31/2020	Acquired	Reauthorization	G11 G12

Course Description

Calculus (AP) 35 provides students with the opportunity to learn high level calculus in a supportive high school classroom. This course series provides students with opportunities to explore the concepts, methods and applications of calculus. The course emphasizes a multi- representational approach to calculus, with concepts, results, and problems being expressed graphically, numerically, analytically, and verbally. The intent of Calculus (AP) 35 is to prepare students for the Calculus BC AP Exam, to ease students' transition to the first year of post- secondary study and to prepare them for success in science, technology, engineering and mathematics (STEM) programs.

Teachers who wish to view a version of Calculus (AP) 35 that displays specific outcomes in a sequence can download it from LDCOMS. This 'teacher-friendly' version is located in the "Assessment" section of LDCOMS for this course.

Course Prerequisites

The recommended prerequisite for Calculus (AP) 35-5 is Math (AP) 31.

Sequence Introduction (formerly: Philosophy)

The Ministerial Order on Student Learning (#001/2013) states that “the fundamental goal of education in Alberta is to inspire all students to achieve success and fulfilment, and reach their full potential by developing the competencies of Engaged Thinkers and Ethical Citizens with an Entrepreneurial Spirit, who contribute to a strong and prosperous economy and society”. The Calculus (AP) 35-5 course supports many elements of this ministerial order through the establishment of outcomes that foster critical thinking, problem solving, reflection, exploration and experimentation. A student in Calculus (AP) 35 will also use technologies and tools to learn, innovate, collaborate and communicate to achieve the course outcomes.

One of the goals of Calculus (AP) 35 is for students to develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment. Calculus (AP) 35 engages the student in the study of calculus concepts and provides opportunities for students to experience its methods and applications. This course emphasizes a multi-representational approach to calculus, with concepts, results, and problems being expressed graphically, numerically, analytically, and verbally.

Calculus (AP) 35 provides an opportunity for students to strive for excellence in preparing for the Calculus BC AP Exam with opportunities for recognition of success by post-secondary institutions.

Student Need (formerly: Rationale)

Calculus (AP) 35 was developed based on the Advanced Placement Calculus BC course, which is considered equivalent to a second semester university level calculus course. It is designed for students in the Advanced Placement (AP) alternative program at Edmonton Public Schools.

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Scope and Sequence (formerly: Learner Outcomes)

General Outcomes
The aim of the Calculus (AP) 35 course is articulated through four general outcomes. These four general outcomes serve as the foundation of the Calculus (AP) 35 course and identify what students are expected to be able to do upon completion of the course. The general outcomes are interrelated and interdependent.

Specific Outcomes
Each general outcome is elaborated with a set of specific outcomes. Achievement of the specific outcomes enables students to develop and demonstrate the four general outcomes. Each specific outcome is to be addressed.

Specific outcomes are developmentally appropriate, building upon and making connections to prior learning throughout the Calculus (AP) 35 course. Depending on the learning context and developmental needs of students, specific outcomes may be delivered individually, in an integrated manner, or as groups of outcomes.

Guiding Questions (formerly: General Outcomes

1 Students will analyze antiderivatives and integrals using a variety of strategies.

2 Students will analyze infinite series to determine convergence or divergence.

3 Students will utilize knowledge of Taylor polynomials to approximate functions and solve real world problems.

4 Students will analyze parametric, polar and vector valued functions.

Learning Outcomes (formerly: Specific Outcomes)

1 Students will analyze antiderivatives and integrals using a variety of strategies.	**35-5**
1.1 solve problems involving integration by parts and simple partial fractions of nonrepeating linear factors	X
1.2 interpret improper integrals as limits of definite integrals to: a. determine divergence or convergence of the integral b. evaluate the convergent integrals	X
1.3 solve problems involving improper integrals	X
1.4 solve logistic differential equations	X
1.5 apply logistic differential equations to growth modeling contexts	X
1.6 justify conclusions from differential equations relating to analyses of growth modeling contexts	X
1.7 approximate a solution to a differential equation using Euler's method	X

2 Students will analyze infinite series to determine convergence or divergence.	**35-5**
2.1 define a series as a sequence of partial sums	X
2.2 analyze series convergence and divergence by applying the following tests: a. Geometric Series Test b. P-Series Test c. N th Term Test d. Integral Test e. Direct Comparison Test f. Limit Comparison Test g. Alternating Series Test h. Ratio Test i. Root Test	X

3 Students will utilize knowledge of Taylor polynomials to approximate functions and solve real world problems.	**35-5**
3.1 develop the Maclaurin series for a given function	X
3.2 develop the Taylor series centred at x=a for a given function	X

3.3 apply a known Maclaurin series to develop the Maclaurin series for a related function using substitution, differentiation and anti-differentiation	X
3.4 apply a known Taylor series in the development of the Taylor series for a related function using substitution, differentiation and anti-differentiation	X
3.5 analyze functions defined by a power series	X
3.6 determine the radius and interval convergence of a power series	X
3.7 analyze and justify the accuracy of Taylor polynomial approximations using the following error bounds: a. Lagrange error bound b. alternating series error bound	X

4 Students will analyze parametric, polar and vector valued functions.	**35-5**
4.1 graphically represent the following: a. parametric functions b. polar functions c. vector valued functions	X
4.2 analyze and form conclusions regarding the behavior of the following functions based on first and second derivatives: a. parametric functions b. polar functions c. vector valued functions	X
4.3 calculate lengths of the following functions: a. parametric functions b. polar functions c. vector valued functions	X
4.4 calculate the area enclosed within a polar curve	X

Facilities or Equipment

Facility

This course must be delivered in a facility that meets all Division health and safety requirements, including Administrative Policy 113 - Occupational Health and Safety and Admin Policy 103 - Safe and Caring Learning Environments for Students.

Facilities:

Equipment

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Learning and Teaching Resources

A wide range of resources may be used to meet the outcomes of this course series a should align with criteria outlined in GI.AR - Teaching and Learning Resources, HF.E Caring and Respectful Learning Environments and HF.AR – Safe, Caring and Respe Learning Environments.

Sensitive or Controversial Content

No specific sensitive or controversial issues have been identified.

Issue Management Strategy

Health and Safety

No specific safety risks or hazards are identified for this course.

Risk Management Strategy

Statement of Overlap with Existing Programs

There is no significant overlap with any provincially approved courses.

Student Assessment

The primary purpose of assessment is to improve student learning and provide valid and reliable information to students and parents/guardians about student progress related to Alberta programs of study and locally developed courses of study. Student achievement and growth related to all locally developed courses is to be assessed, evaluated and reported in accordance with the following provincial and District requirements:
-School Act
-Guide to Education
-Teaching Quality Standard Applicable to the Provision of Basic Education in Alberta (Ministerial Order #016/97)
-GK.BP Student Assessment, Achievement and Growth
-GKB.AR Standards for Evaluation

This locally developed course must be delivered and assessed by a teacher possessing a valid Alberta Teaching Certificate.

Course Approval Implementation and Evaluation