

# UAF DMS Guidelines for

## MATH 230X – Essential Calculus with Applications

Across all sections of Math 230X offered by UAF campuses (delivered in person or online), all syllabi must minimally satisfy the following requirements.

1. General guidelines set by UAF; follow this link to the [UAF syllabus requirements](#)
2. GER Information (sample statement below):

This course is listed as a General Education Math Course as such this course is expected to meet the 4 general learning outcomes.

1. Build knowledge of human institutions, sociocultural processes, and the physical and natural works through the study of mathematics. Competence will be demonstrated for the foundational information in each subject area, its context and significance, and the methods used in advancing each.
2. Develop intellectual and practical skills across the curriculum, including inquiry and analysis, critical and creative thinking, problem solving, written and oral communication, information literacy, technological competence, and collaborative learning. Proficiency will be demonstrated across the curriculum through critical analysis of proffered information, well-reasoned solutions to problems or inferences drawn from evidence, effective written and oral communication, and satisfactory outcomes of group projects.
3. Acquire tools for effective civic engagement in local through global contexts, including ethical reasoning, intercultural competence, and knowledge of Alaska and Alaska issues. Facility will be demonstrated through analyses of issues including dimensions of ethics, human and cultural diversity, conflicts and interdependencies, globalization, and sustainability.
4. Integrate and apply learning, including synthesis and advanced accomplishment across general and specialized studies, adapting them to new settings, questions and responsibilities, and forming a foundation for lifelong learning. Preparation will be demonstrated through production of a creative or scholarly product that requires broad knowledge, appropriate technical proficiency, information collection, synthesis, interpretation, presentation and reflection.

3. Text: Mathematics with Applications in Business and Social Sciences by HAWKES Learning

- Chapter 10: 10.1-10.9 (r)
- Chapter 11: 11.1-11.6 (r)
- Chapter 12: 12.1-12.6 (r)
- Chapter 13: 13.1-13.6 (r), 13.5 (o)
- Chapter 14: 14.1-14.6 (r)
- Chapter 15: 15.1, 15.2, 15.4 (r), 15.3, 15.5, 15.6 (o)

4. Online Homework System

This text comes with the HAWKES online homework which has a template for this course. This can be modified to adjust ordering of topics or due date and integrates with Canvas.

5. Timing of material

For each of the following, the minimum time spent on the sections is listed.

This is a suggested outline with three exams. Modifications can be made if giving four exams.

Section Topic Approx. timing

10.1 One-sided Limits	1 day
10.2 Limits	1 day
10.4 More about Limits	½ -1 day

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10.4 Continuity	1-1½ days
10.5 Average Rate of Change	1 day
10.6 Instantaneous Rate of Change	1 day
10.7 Definition of Derivative and Power Rule	1-1½ days
10.8 Techniques for Finding Derivatives	1 day
10.9 Applications: Marginal Analysis	1 day
Exam over Chapter 10	
11.1 Product and Quotient Rules	1 day
11.2 The Chain Rule and General Power Rule	1-1½ days
11.3 Implicit Differentiation and Related Rates	2 days
11.4 Increasing and Decreasing Intervals	1 day
11.5 Critical Points and the First Derivative Test	1 day
11.6 Absolute Maximum and Minimum	1 day
12.1 Concavity and Points of Inflection	1 day
12.2 The Second Derivative Test	1 day
12.3 Curve Sketching: Polynomial Functions	1-1½ days
12.4 Curve Sketching: Rational Functions	1 day
12.5 Business Applications	1 day
12.6 Other Applications	1-2 days
Exam overs Chapters 11 and 12	
13.1 Derivatives of Logarithmic Functions	1 day
13.2 Derivatives of Exponential Functions	1 day
13.3 Growth and Decay	1-1½ days
13.4 Elasticity of Demand	1 day
13.6 Differentials	1 day
14.1 The Indefinite Integral	1 day
14.2 Integration by Substitution	1 day
14.3 Area and Riemann Sums	1-2 days
14.4 Fundamental Theorem of Calculus	1 day
14.5 Area Under a Curve with Applications	1 day
14.6 Area Between Curves with Applications	1 day
15.1 Integration by parts	1 day
15.2 Annuities and Income Streams	1 day
15.4 Numerical Integration	1 day

Exam over Chapters 13, 14, and 15

Review Chapters 10-15

Final over Chapters 10-15

### 6. Types of Assessments

- Other Assessed Work
  - for online work through HAWKES, mastery level should be no less than 75%
  - instructors should provide written feedback to students approximately weekly throughout the semester; this can be through humanly-graded assignments or email correspondence
- Exams
  - at least two exams during the semester
  - exams must be timed, closed book, closed notes
  - exams should have some form of proctoring
  - use of non-graphing calculators is allowed on this course
  - exams must be majority written answer (not multiple choice)
  - exams must be paper-and-pencil exams, written and graded by faculty members
  - exams should not be reused from previous semesters, limited reuse of edited problems is acceptable
- Final Exam

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- must be cumulative and representative of the entire course
- must include problems from each Assessment Criteria listed on the next page
- Students are expected to know on their own (no formulas provided on the test for the following):
  - \* differentiation formulas
  - \* integration formulas

### 7. Assessment Criteria

Final exams should contain problems that demonstrate the students' acquired knowledge of the following topics.

- Fundamentals- Algebra
  - simplify algebraic expressions involving negative and fractional exponents, compound fractions, and rational expressions
  - solve a problem using modeling with equations (eg. area, length, mixtures, distance, or rate)
- Limits
  - evaluate a two-sided limit
  - evaluate a one-sided limit
  - evaluate an infinite limit
  - express with proper notation
  - find limits from graph
- Continuity
- Graphs
  - find domain and range
  - find intercepts
  - find critical and hypercritical points
  - find asymptotes
  - identify intervals where the function is increasing or decreasing
  - identify intervals where the function concave up or down
  - identify points that are extreme values or inflection points
- Differentiation and integration
  - understand and use basic properties
  - find derivatives of more complicated functions
    - \*Chain rule
    - \*Logarithmic Differentiation
  - find integrals of more complicated functions
    - \*Integration by Parts
    - \*Numerical Integration
  - understand the fundamental theorem of calculus
- Apply Derivatives to Applications (minimum of 2)
  - modeling with related rates
  - modeling with optimization
  - modeling with differentials
  - modeling with growth/decay
  - modeling with Elasticity
- Apply Integrals to Applications (minimum of 2)
  - modeling average value
  - modeling surplus
  - modeling growth/decay
  - modeling area
  - modeling rate of flow

### 8. Grading Policy

- The syllabus must include a grading scale of some form.

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- Plus/minus grading is at the discretion of the instructor, but must be stated explicitly.
- Withdrawal and Incomplete policies must be stated explicitly.
- The final grade in this course must adhere to the following:
  - Written Assessed Work at least 15% and at most 30%
  - Online Assessed Work at most 15%
  - Midterm Exams At least 35%
  - Comprehensive Final Exam At least 15%

### 9. Tutoring Services

DMS Math and Stat Lab: If you need extra math help, there is free tutoring available. The Math and Stat Lab is located in CHAP 305 and is staffed by Math Graduate students, upper-division Math students and Math faculty. This lab operates on a walk-in basis and schedules are posted that provide tutor times.

DMS One-on-one Tutoring: Free tutoring by appointment. This service is available to any UAF student registered in a core MATH/STAT course. Tutoring is available in CHAP 210. Appointments can be made for 30 minutes or an hour and can be scheduled up to two weeks in advance. Students can sign up for an appointment at <https://uaf.traccloud.com>

DMS Online Tutoring: Free tutoring available Monday - Saturday! This service is available to any UAF student registered in a MATH or STAT course. Tutoring is accessible through Zoom. Appointments can be made for 30 minutes or an hour and can be scheduled up to two weeks in advance. To schedule an appointment students can sign up for an appointment at <https://uaf.traccloud.com>

### 10. Other University Information that should be included

SSS (Student Support Services): SSS provides one-on-one tutoring to students who satisfy the requirements of the program. In addition to math tutoring, SSS provides advising, all core subject tutoring, laptop rentals, and some other services.

Office of Disability Services: This office implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities. Please provide the current accommodation paperwork to me as soon as you receive it. Without the letter, no accommodations will be made.

Equity and Inclusion Statement: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please visit Students Rights and Responsibilities (Links to an external site.).

Coronavirus information: Visit the UA coronavirus information website (Links to an external site.) to learn how the University of Alaska is responding to the novel coronavirus/COVID-19 situation and find links to communications, policy guidance, and resources.

Emergency Notification Plan: Students will receive emergency notifications via phone email. Please check your UAOnline account to confirm your emergency notification settings. For more information, please refer to the Student Handbook. For course-specific notifications or one that your instructor plans to forward, you will receive these through Canvas notifications, so please update your profile in Canvas.

## Math 230X Syllabus Guidelines

Extended absence policy: The University of Alaska Fairbanks recognizes that students may need to miss more classes than allowed by a particular instructor as specified in course policies. Extended absences are defined as missed classes or course work by students beyond what is permissible by the instructor's written course policies. Students may need to miss class and/or course work for a variety of reasons, including, but not limited to:

- Bereavement
- Personal illness or injury
- Serious illness of a friend, family member or loved one
- Military obligations
- Jury service
- Other emergency or obligatory situations

For more information, go to the Students Handbook or the Center for Students Rights and Responsibilities.

Nondiscrimination Statement: The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination, including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at [www.alaska.edu/nondiscrimination](http://www.alaska.edu/nondiscrimination). For more information, contact:

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