UAF DMS Guidelines for

MATH 156X –Precalculus

Across all sections of Math 156X offered by UAF campuses (delivered in person or online), all syllabi must minimally satisfy the following requirements.
Note: This course meets 1 hour per day 5 days a week (or should be set up for equivalent "class" time). This course was designed to be a mastery-based course that allows for some individualized learning.

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 though production of a a creative or scholarly product that requires broad knowledge, appropriate technical proficiency, information collection, synthesis, interpretation, presentation and reflection.

3. Text: Precalculus by Sisson
  • Chapter 1: 1.1-1.9 (r)
  • Chapter 2: 2.1-2.6 (r)
  • Chapter 3: 3.1-3.6 (r), 3.5 (o)
  • Chapter 4: 4.1-4.4 (r)
  • Chapter 5: 5.1-5.5 (r)
  • Chapter 6: 6.1-6.5 (r)
  • Chapter 7: 7.1-7.4 (r)
  • Chapter 8: 8.1-8.4 (r)
  • Chapter 9: 9.1-9.2 (r)

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

Math 156X Syllabus Guidelines

For each of the following, the minimum time spent on the sections is listed.
This is a suggested outline with Mastery Assessments (score of 80% minimum) and comprehensive Final Exam.
Section Topic Approx. timing

1.1 Real Numbers and Algebraic Expressions	½ -1 day
1.2 Properties of Exponents and Radicals	½ -1 day
1.3 Polynomials and Factoring	1 day
1.4 Rational Expressions	½ -1 day
1.5 Complex Numbers	½ -1 day
1.6 Linear Equations in One Variable	1 day
1.7 Linear Inequalities in One Variable	1 day
1.8 Polynomial and Polynomial-Like Equations	1 day
1.9 Rational and Radical Equations	1 day

Mastery Assessment over Chapter 1

2.1 Cartesian Coordinate System	1 day
2.2 Circles	1 day
2.3 Linear Equations in Two Variables	1 day
2.4 Slope and Forms of Linear Equations	1 day
2.5 Parallel and Perpendicular Lines	1 day
2.6 Linear Inequalities in Two Variables	1 day
3.1 Relations and Functions	1 day
3.2 Linear Functions	1 day
3.3 Quadratic Functions	1 day
3.4 Other Common Functions	1-1½ days
3.6 Mathematical Models	1 day

Mastery Assessment over Chapters 2 and 3

4.1 Transformations of Functions	1 day
4.2 Properties of Functions	1 day
4.3 Combining Functions	1 day
4.4 Inverse Functions	1 day
5.1 Polynomial Functions and Inequalities	1-1½ days
5.2 Polynomial Division and Division Algorithm	1 day
5.3 Locating Real Zeros of Polynomial Functions	1 day
5.4 The fundamental Theorem of Algebra	1 day
5.5 Rational Functions and Inequalities	1-1½ days

Mastery Assessment over Chapters 4 and 5

6.1 Exponential Functions and Their Graphs	1 day
6.2 Exponential Models	1 day
6.3 Logarithmic Functions and Their Graphs	1 day
6.4 Logarithmic Properties and Models	1 day
6.5 Exponential and Logarithmic Equations	1-1½ days
7.1 Radian and Degree Measure	1 day
7.2 Trigonometric Functions and Right Angles	1 day
7.3 Trigonometric Functions and the Unit Circle	1 day
7.4 Graphs of Sine and Cosine Functions	1-1½ days
7.5 Graphs of Other Trigonometric Functions	1-1½ days
7.6 Inverse Trigonometric Functions	1-1½ days

Mastery Assessment over Chapters 6 and 7

8.1 Fundamental Trigonometric Identities	1 day
8.2 Sum and difference Identities	1 day
8.3 Product-Sum Identities	1 day
8.4 Trigonometric Equations	1-1½ days
9.1 The Law of Sines	1-1½ days
9.2 The Law of Cosines	1-1½ days

Mastery Assessment over Chapters 8 and 9
Review Chapters 1-9
Final over Chapters 1-9

6. Types of Assessments
- Homework
  - for online work through HAWKES, mastery level should be no less than 80%
  - instructors should provide written feedback to students approximately weekly throughout the semester; this can be through humanly-graded assignments or email correspondence
- Mastery-Based Assessments
  - at least five assessments during the semester with minimum mastery of at least 80%
  - assessments must be proctored, timed, closed book, closed notes
  - use of non-graphing calculators are allowed in this course but not for chapters 1-4
  - assessments must be majority written answer (not multiple choice)
  - assessments must be paper-and-pencil exams, written and graded by faculty members
  - assessments should not be reused from previous semesters, limited reuse of edited problems is acceptable
  (Students should be allowed to retake assessments at least once if min of 80% is not met- these should not be the same assessment)
- Final Exam
  - 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):
    * equation of lines formulas
    * quadratic formula
    * exponential and logarithmic properties
    * simple and compound interest formulas
    * basic trig formulas (reciprocal, quotient, Pythagorean)

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)
- Functions
  - evaluate a function at a given point
  - evaluate a difference quotient
  - express with proper notation
  - find the domain and range
  - find the average rate of change - from graph or from equation
- Graphs
  - find domain and range
  - find intercepts
  - transformations of basic functions
- Combinations and Composition of Functions
- Inverse Functions
  - find domain and range
  - find the equation of an inverse
  - graph an inverse function
- Quadratic Functions
  - graph a quadratic given an equation

- **–** identify the max/min value
- **–** modeling with quadratics
- Polynomial Functions
    - **–** graph by finding zeros and identifying end behavior
    - **–** identify the equation from a graph
    - **–** graph a rational function by identifying intercepts and asymptotes
- Exponential and logarithmic Functions
    - **–** graph a transformed exponential/ logarithmic function
    - **–** identify the equation of a graph of an exponential function
    - **–** use laws of logarithms to evaluate, combine or expand logarithmic expressions
- Exponential and Logarithmic Equations
    - **–** Solve various types of exponential and logarithmic equations algebraically
    - **–** modeling with exponential functions
- Angle Measures
- Trigonometric Values
    - basic angles
    - coterminal angles
    - for a given point
- Trigonometric Graphs
    - find domain and range
    - find amplitude, phase shift, and period
    - find intercepts and asymptotes
- Solve Trigonometric Equations
    - Linear trigonometric equations
    - Equation involving either quadratic, factoring, or the use of identities
- At least two of the following:
    - Evaluate inverse trigonometric functions
    - Evaluate composition of trigonometric and inverse trigonometric function (both orders)
    - Domain, range, and properties of inverse trigonometric functions
- Applications
    - Right angle trigonometry (such as angle of elevation/depression)
    - Laws of Sine and Cosine (such as navigation, bearing)
    - Arc length and/or area of sector
    - Linear/angular velocity

8. Grading Policy
- The syllabus must include a grading scale of some form.
- 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 25%
    HAWKES (individualized mastery work) at least 10% and at most 20%
    Assessments at least 40%
    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.

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. For more information, contact:

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