C O U R S E O U T L I N E
MT. HOOD COMMUNITY COLLEGE DISTRICT
Gresham, Oregon 97030

* New _____

*Revised 10/25/06

* Review only (no changes) _____ (Date)

* COURSE TYPE Please check appropriate box:

- ☒ Lower Division Collegiate
- ☐ Occupational Supplementary
- ☐ Occupational Preparatory
- ☐ Other Education, Including General Ed & Adult Ed

COURSE TITLE Pre- Calculus I: Elementary Functions

COURSE NUMBER MTH 111 COURSE CREDIT 5

* Lecture Hours 5 | _____ Wkly/Term Lab Hours _____ | _____ Wkly/Term Seminar Hours _____ | _____ Wkly/Term

* GRADING STATUS:

☒ Letter Grade Only ☐ S/U Only ☐ Optional ☐ No Grade

* HEADCOUNT LOADING:

☐ Yes ☒ No * Factor _____

Guided Studies Requirement:
Student must be proficient in:

- ☒ Reading (RD90)
- ☒ Writing (WR90)
- ☒ Mathematics (MTH20)
- ☐ Not applicable

For Instruction Office Use Only
General Education Category
Apply general requirement or distribution to:

AA_____ AS_____ AS/OT-Bus_____

AAS_____AGS_____

VP Approval _____Date_____

Mathematics Department	10/25/06		
1) Prepared by	Date	4) Approved by Dean	Date
2) Approved by Distance Education Admin.	Date	5) Curriculum Committee	Date
3) Approved by Department Chair	Date	6) Approved by VP for Student Learning	Date

* See legend/definition for explanation

COURSE DESCRIPTION: (for catalog)
This course is part I of a pre-calculus sequence that provides an extensive study of functions and their inverses modeled algebraically, numerically, and graphically. Specific functions include the exponential, logarithmic, polynomial, and power functions. Modeling real world applications are emphasized. A graphing calculator is required.
PREREQUISITE:
MTH 95 with a C or better, or suitable performance on the mathematics placement exam.

INSTRUCTIONAL MATERIALS REQUIRED OF STUDENT: (text, supplies, etc.)
Text, Graphing Calculator

STUDENT LEARNING OUTCOMES:
Upon successful completion of this course, the student will be able to: (All objectives will be evaluated from application settings and verbal, numerical, visual, graphical, and algebraic models.)

1. **Communicate** effectively (orally and in writing) a problem solving process, results, and conclusions using mathematical terminology and correct mathematical syntax.

2. Apply mathematical reasoning and **modeling** to solve problems arising from the real world. Model problem situations using mathematics verbally, numerically, visually, graphically, and/or algebraically.

3. Make **connections** among the various models.

4. Determine if a solution is reasonable and **verify results**.

5. Maintain and strengthen **prerequisites**, especially: percents, linear and quadratic functions, solving equations.

6. Evaluate, apply, and interpret **function notation**, including inverse functions and compositions of functions.

7. Determine the **domain and range** of functions, including identifying asymptotes.

8. Sketch basic **graphs** by hand, without notes, including: $y = x$, $y = |x|$, $y = x^2$, $y^2 = x$, $x^2 + y^2 = 1$, $y = x^3$, $y = \frac{1}{x}$, $y = \sqrt{x}$, $y = \frac{1}{x^2}$, $y = \log(x)$, $y = e^x$, and $y =$ a constant. Also, be able to sketch piece-wise, step and inverse functions.

9. Use the **characteristics of basic functions**, especially slope, intercepts, rate of change, percent change, and average change, to answer questions in application situations, to write equations, and to create graphs by hand and on the calculator. The basic functions include: linear, constant, polynomial, exponential, logarithmic, power, piece-wise, step, and inverse functions.

10. Approximate extrema and intervals where a function is **increasing, decreasing, or constant** from a numerical or graphical model.

11. Demonstrate the **inverse relationship** between an exponential function and a logarithmic function (with the same base).

12. Recognize an exponential relationship given numerically or verbally, determine the **growth/decay rate**, and use this information to write an equation to model the relationship.

13. Solve equations algebraically using **properties of exponents and logarithms**.

14. Use the relationship between the **zeros of a polynomial and the factored form** to find a graphing window or to write an equation.

15. Sketch or describe the possible shape of a polynomial function of degree "n" including: the number of **turning points**, number of possible real roots, and end behavior.

16. Use **transformations** of a basic function to sketch graphs, model situations algebraically, model real data algebraically, and determine domain/range and asymptotes.

17. Given a set of real data points, determine the most appropriate function type (linear, quadratic, exponential, logarithmic, piecewise or step) and calculate the **best fitting curve** using appropriate technology.

GENERAL INSTRUCTIONAL METHODS:
The standard delivery of the curriculum will be a team-based, guided discovery learning format supplemented by lecture format. The MHCC Mathematics Curriculum emphasizes conceptual understanding, real-world applications, multiple representations of problem situations, making connections, mathematical modeling and mathematical problem solving. This represents a shift away from technique mastery and procedural skills. For students to see mathematics as an integrated whole, the above objectives should be presented in a connected fashion and not treated as discrete topics or concepts. Further details regarding specific teaching methodologies are described in handouts available in the department.

Additional Methods for Distributed Learning formats:
Should the course be taught using Distributed Learning formats (e.g., World Wide Web, Internet, Television, Satellite, US Mail, email, etc.) the following will also be applied:

One or more communication tools (e.g., discussion boards, listserves, online chat rooms, email, special face-to-face meetings, etc.) will be used to facilitate interaction among all participants in the class.

The faculty, in consultation with a distributed learning instructional designer, will select and use instructional methods appropriate to the audience, the course outcomes, and general instructional methods.

EVALUATION PROCESS:

Passing this course with a C or better serves as a prerequisite for Math 112. Ensure that your grading plan will mean that students satisfying this requirement are prepared for Math 112. This requires attention to the amount of verifiable individual work completed by the student. You must give a cumulative in-class final exam to help ensure that students are truly prepared for the next course.

Grades should be based on a balanced variety of grading opportunities spread throughout the term. Although you may not choose to use every method below, a variety of methods is expected. Student evaluation must include problems or activities that incorporate and integrate several outcomes, and closely resemble situations that exist in the real world.

- Worksheets
- Projects
- In-class Individual Exams
- In-class Team Exams
- Take-Home Individual Exams
- Take-Home Team Exams
- Writing Assignments
- Daily Homework
- Attendance
- Teamwork/Participation

Additional Evaluation Process for Distributed Learning formats:

Assessment of course outcomes is designed to be verified as appropriate using proctoring methods. The same outcomes and grading standards will apply for all instructional formats.