# COURSE OUTLINE

<table>
<thead>
<tr>
<th>Course Number:</th>
<th>MTH-251</th>
</tr>
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<tbody>
<tr>
<td>Title:</td>
<td>Calculus I</td>
</tr>
<tr>
<td>Approval Date:</td>
<td>March 2015</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Credits:</th>
<th>5</th>
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<tbody>
<tr>
<td>Length of Course:</td>
<td>55 lecture hours</td>
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*For each credit, the student will be expected to spend, on average, 3 hours per week in combination of in-class and out-of-class activity.*

<table>
<thead>
<tr>
<th>Grading Method:</th>
<th>A-F or Pass/No Pass</th>
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<tbody>
<tr>
<td>Prerequisites:</td>
<td>Pass MTH-112 with a C or better or placement in MTH-251</td>
</tr>
<tr>
<td>Co-requisites:</td>
<td>None</td>
</tr>
<tr>
<td>Recommended:</td>
<td>Pass RD-090 or placement in RD-115; pass WR-095 or placement in WR-121</td>
</tr>
<tr>
<td>Required:</td>
<td>None</td>
</tr>
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<table>
<thead>
<tr>
<th>Certified General Education Area(s):</th>
<th>Mathematics</th>
</tr>
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<tbody>
<tr>
<td>Related Instruction Area:</td>
<td>Computation</td>
</tr>
<tr>
<td>Uses library resources:</td>
<td>Yes</td>
</tr>
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<table>
<thead>
<tr>
<th>Department:</th>
<th>Mathematics</th>
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<tr>
<td>Outline Developed by:</td>
<td>Mark Yannotta</td>
</tr>
<tr>
<td>Course Approved as:</td>
<td>Lower Division Collegiate</td>
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## Course Description:
Topics and applications of differentiation. This course is the first in a four-term sequence designed for students in science, engineering, or mathematics. It will focus on differential calculus.

## Student Learning Outcomes:
*Upon successful completion of this course, students should be able to:*

1. estimate limits numerically and graphically, (MA1)
2. determine limits numerically, graphically, and algebraically; (MA1) (MA2)
3. demonstrate understanding of the limit definition of the derivative and its interpretation as an instantaneous rate of change, (MA1) (MA2)
4. find derivatives numerically, algebraically, and graphically; (MA1)
5. interpret the meaning of the first and second derivatives in various applications, (MA2)
6. demonstrate understanding of the derivative as a function in its own right and use the local linearity of functions to obtain approximations from the derivative, (MA1) (MA2)
7. demonstrate proficiency in differentiation, specifically choosing the appropriate derivative rule for the appropriate type of function; (MA2)
8. communicate understanding as to why the various derivative rules are true, (MA2)
9. investigate families of functions using graphing technology to observe their properties and the first and
second derivatives to verify these observations. (MA1) (MA2)
10. use derivatives in problem solving that requires sustained reasoning to reach successful conclusions. (MA1) (MA2)

Major Topic Outline:
1. Limits.
   a. The purpose is to provide an understanding of the limit of a function and the various methods for determining a limit.
2. Differentiation.
   b. The purpose is to provide a practical understanding of the limit definition of the derivative and its interpretation as an instantaneous rate of change.
   a. Techniques of differentiation.
   b. The chain rule, and implicit differentiation.
4. Using the derivative.
   a. The first and second derivatives are used to analyze the behavior of families of functions and to solve optimization problems.
AAOT/ASOT GENERAL EDUCATION OUTCOMES
COURSE OUTLINE MAPPING CHART

Mark outcomes addressed by the course:

- Mark “C” if this course completely addresses the outcome. Students who successfully complete this course are likely to have attained this learning outcome.
- Mark “S” if this course substantially addresses the outcome. More than one course is required for the outcome to be completely addressed. Students who successfully complete all of the required courses are likely to have attained this learning outcome.
- Mark “P” if this course partially addresses the outcome. Students will have been exposed to the outcome as part of the class, but the class is not a primary means for attaining the outcome and assessment for general education purposes may not be necessary.

As a result of completing the AAOT/ASOT general education requirements, students will be able to:

WR: Writing Outcomes

1. Read actively, think critically, and write purposefully and capably for academic and, in some cases, professional audiences.
2. Locate, evaluate, and ethically utilize information to communicate effectively.
3. Demonstrate appropriate reasoning in response to complex issues.

SP: Speech/Oral Communication Outcomes

1. Engage in ethical communication processes that accomplish goals.
2. Respond to the needs of diverse audiences and contexts.
3. Build and manage relationships.

MA: Mathematics Outcomes:

C 1. Use appropriate mathematics to solve problems.
C 2. Recognize which mathematical concepts are applicable to a scenario, apply appropriate mathematics and technology in its analysis, and then accurately interpret, validate, and communicate the results.

AL: Arts and Letters Outcomes

1. Interpret and engage in the Arts & Letters, making use of the creative process to enrich the quality of life.
2. Critically analyze values and ethics within range of human experience and expression to engage more fully in local and global issues.

SS: Social Science Outcomes

1. Apply analytical skills to social phenomena in order to understand human behavior.
2. Apply knowledge and experience to foster personal growth and better appreciate the diverse social world in which we live.

SC: Science or Computer Science Outcomes

1. Gather, comprehend, and communicate scientific and technical information in order to explore ideas, models, and solutions and generate further questions.
2. Apply scientific and technical modes of inquiry, individually, and collaboratively, to critically examine the influence of scientific and technical knowledge on human society and the environment.
3. Assess the strengths and weaknesses of scientific studies and critically examine the influence of scientific and technical knowledge on human society and the environment.