### I. ASCRC General Education Form

<table>
<thead>
<tr>
<th>Group</th>
<th>III Symbolic Systems</th>
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<tbody>
<tr>
<td>Dept/Program</td>
<td>Mathematical Sciences</td>
</tr>
<tr>
<td>Course #</td>
<td>152</td>
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| Course Title     | Calculus I |
| Prerequisite     | Math 112 or 121 |
| Credits          | 4            |

### II. Endorsement/Approvals

Complete the form and obtain signatures before submitting to Faculty Senate Office.

<table>
<thead>
<tr>
<th>Instructor</th>
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<tr>
<td>Phone / Email</td>
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<tr>
<td>Program Chair</td>
<td>Dave Patterson</td>
</tr>
<tr>
<td>Dean</td>
<td>Gerald A. Fetz</td>
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</table>

### III. Description and purpose of the course:

General Education courses must be introductory and foundational. They must emphasize breadth, context, and connectedness; and relate course content to students’ future lives: See Preamble: [http://www.umt.edu/facultysenate/gened/GEPreamble_final.htm](http://www.umt.edu/facultysenate/gened/GEPreamble_final.htm)

### IV. Criteria:

Briefly explain how this course meets the criteria for the group. See: [http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm](http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm)

1. rigorously present a mapping between a real-world system and a human abstraction of the system.

   Calculus presents the tools for analyzing mathematical models of real-world phenomena involving change.

2. applies analysis, reasoning and creative thinking in the understanding and manipulation of symbolic codes.

   This course provides tools (like differentiation and integration) to analyze models involving change and to use them to make predictions.

3. utilizes alternative methods of communication, perception, and expression in order to encourage rigorous thinking.

   This course emphasizes the connection between graphical and analytical representation of functions, derivatives and integrals.

### V. Student Learning Goals:

Briefly explain how this course will meet the applicable learning goals. See: [http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm](http://www.umt.edu/facultysenate/ASCRCx/Adocuments/GE_Criteria5-1-08.htm)

1. demonstrate an understanding of the symbols and the transformations of the system.

   Refer to attached learning goals Goal 5

2. relay and interpret information in terms of the given symbolic system.

   Goals 1-3, 6

3. apply creative thinking using the symbolic system in order to solve problems and communicate ideas.

   Goal 4
**Course: MATH 152**  
**Title: Calculus I**  

**Date revised: September 10, 2008**

I. **Purpose of the Course**: To learn the basic subject matter of calculus and to prepare students for higher level courses in mathematics.

II. **Course Description** (from [http://www.umt.edu/catalog/mathsci.htm](http://www.umt.edu/catalog/mathsci.htm)):

  **U 152 Calculus I 4 cr.** Offered autumn and spring. Prereq., MATH 112 or 121 or appropriate placement score. Differential calculus, including limits, continuous functions, Intermediate Value Theorem, tangents, linear approximation, inverse functions, implicit differentiation, extreme values and the Mean Value Theorem. Integral Calculus including antiderivatives, definite integrals, and the Fundamental Theorem of Calculus.

III. **Credit Hours**: 4

IV. **Frequency of Offering**: Every semester (several sections)

V. **Audience**: Primarily beginning lower level undergraduate math or physical sciences majors and others wanting the thorough mathematical background provided by calculus.

VI. **Learning Goals** (What do we want the students to learn?):

1. Understand the concepts of limit and continuity.
2. Understand the concept of derivative (limit definition, geometric interpretation via tangent lines, interpretation as a rate of change).
3. Be able to compute derivatives (including derivatives of functions defined implicitly).
4. Understand the relationship between the derivative and the graph of a function.
5. Be able to translate a practical problem into a mathematical problem that can be solved using calculus.
6. Understand the definition and the basic properties of the definite integral.

VII. **Typical Methods of Course Assessment**: EX (W, IC), HW.
VIII. **Course Format**: Typically a mixture of lecture and discussion group (sometimes involving in-class group work).

IX. **Use of Technology** (if any): Regular use of graphing calculators (which are required). Some instructors use computer algebra systems for demonstrations.