Course Title: **Mathematical Modeling for Secondary Teachers**  
St. Michael's College  
Credits: 3

*This class is a hybrid class of two face-to-face meetings and a substantial online learning component through EDU20 (CVEDCVT.edu20.org).*

**Face-to-face Meetings:**  
Classes will start promptly at 8:30 a.m, lunch at 11:30 – 12:15, and conclude at 4:30 p.m.  
- First Day – February 3  
- Symposium Day - May 1  
(Online submissions completed by 11:59 pm on May 4)

**Online Component:**  
The majority of this course will be delivered online. Educators will need to allot substantial time and participation each week during the course to participate in the course. Students will need to respond to weekly discussion posts in the online forum as well as respond their peers in order to ensure a rich discussion and maximize the learning of each educator. Major assignments will also be shared within the forum for peer feedback prior to revisions and submission of final projects.

**Instructor’s Contact Information**  
Julie Conrad  
jconrad@uvm.edu  
(802) 578-1460

**Overview of Course**

This hybrid course provides an introduction in mathematical modeling as described in the Common Core State Standards (CCSS). The Mathematical Practice Standards of the Common Core emphasis the study and application of applied mathematics and the utilization of the modeling process to expand student understanding of mathematics. Topics will include the modeling process, the modeling cycle, and modeling statistics.

This course requires that participants not only develop a better understanding of the principles and expectations of modeling in the CCSS but also in the pedagogical and instructional practices in which participants engage high school students in the modeling process.

**Text & Resources**

Copies of text that will be provided will include:


Content and Objectives

Introduction to Mathematical Modeling

- Develop a deep understanding of the CCSS emphasis of modeling and the progression of modeling from kindergarten through high school, including statistical models.
- Enrich high school learning opportunities and problem solving based on an understanding of the mathematical modeling.

Introduction to the Modeling Process

- Understand the modeling process and apply the modeling process within high school mathematics instructional practices.

Teachers will

- collect and analyze student work of the modeling process to unearth and address common errors and misconceptions in the mathematical content which underlies the models.
- create, implement and share targeted instruction to support student learning in the development of the modeling process as well as in the problem solving strategies in which students need to model to understand.
- will investigate how to use modeling as a means to collect data around student understanding
- will use the Common Core State Standards to guide the development of teaching and learning strategies.

Assignments

Overview of Assignments:

1. Reading:

   Due Date: On-going

   Throughout this course you will be required to read several scholarly articles on the mathematical modeling process as well as research a variety of fields of study to determine relationships in which we can model. These reading are assigned to enhance your
understanding of models, the modeling process as well as introduce secondary mathematics teachers to rich contextual areas where mathematics is applied.

2. **Electronic Journal & Final Reflection**
   **Due Date:** Journal On-going
   **Final Reflection due on May 1**
   You will maintain an electronic journal consisting of notes you take in researching other contextual areas and reflect on the readings and coursework. Your notes will need to be properly cited using APA format. Your journal should reflect a deep level of thought and exploration of the topic.

   Journal Criteria and Assessment Rubric will be provided at first class.

3. **Integrated Mathematical Modeling Task Analysis and Design:**
   **Due Date:** Tasks Set #1 December 10
   Task Set #2 February 3
   Throughout the course, part of the homework assignments will be for you to analyze the strengths of a modeling task and/or designing a modeling task which is relevant to the mathematical concepts that you are teaching this year.

   Assignment Criteria and Assessment Rubric will be provided at first class.

4. **Modeling Mini-Unit Design:**
   **Due Date:** Draft due February 3
   Final due March 10
   You will create a Modeling Unit utilizing backwards design that serves as guide to introduce your students to the Mathematical Modeling Process. The unit will serve as a tool to ensure that all students are developing their expertise of the modeling process and developing a deeper understanding of linear and non-linear modeling.

   Assignment Criteria and Assessment Rubric will be provided at first class.

5. **Symposium Presentation**
   **Due Date:** May 1, 2014
   This project is intended to highlight your new learning around mathematical modeling, the modeling process and its connection to a major content area of the Common Core State Standards. Teachers are expected to reflect upon the impact of this new learning on their teaching and students’ learning.

   **Project Requirements:**
   1. Identify a focus of new learning that connects to the big idea of mathematical modeling.
2. Articulate the aspect of the big idea that was the most salient.
3. Provide artifacts that led to the new learning.
4. Provide details for the next actionable steps from this new learning.

**Presentation Requirements:**
1. Choose a format for your presentation. (Examples: IGNITE presentation, visual presentation for a gallery walk, five-minute video, etc.)
2. Clear articulation of the learning must be present in the presentation regardless of the format of the presentation.
3. Prepare a 5 to 10 minute presentation. This presentation should highlight the most important findings during your project. Share what you think others would find most valuable.

Assignment Criteria and Assessment Rubric will be provided at first class.

**Evaluation Criteria**

The course grade will be based upon class attendance and participation, and the quality of the work produced to fulfill the course assignments described above. Specific criteria and guidelines for course assignments will be made available during the first class meeting. Your grade for this course will be determined by your process and progress of learning and the products you create.

**Process:**
- Attendance and Participation ................................................................. 10

**Progress:**
- Readings and Reading Reflections ......................................................... 15
- Final Reflection ................................................................................... 10

**Products:**
- Task Analysis Assignment ........................................................................ 15
- Mini-Unit Modeling Process Design ......................................................... 25
- Symposium Presentation ........................................................................... 25