

V119 SYLLABUS and SCHEDULE, Spring 2020

Calculus for the Life Sciences, Section 9489

The essentials:

- **Course website:** canvas.iu.edu
- **Classroom:** Student Building SB 150
- **Class time:** 8:00 am - 8:50 am, MWF (Please be on time. :-))
- **Textbook:** *Applied Calculus* by Hughes-Hallett *et al*, 5th edition.
- **Calculator:** Texas Instruments TI-83 is recommended. TI-84/85 ok. Must be able to do graphing and numerical integration, but calculators with computer algebra systems (CAS) are forbidden.

Instructor contact data:

- **Name:** Xuqiang Qin
- **Office:** Swain East 030
- **E-mail:** qinx@iu.edu
- **Office Hours:** Monday 3:00-4:00pm, Wednesday 11:00am-12:00, Friday 9:00-10:00am.

Math V119 is a slight variant of the usual Math M119 course. In this course, applications to the life sciences will be emphasized in lieu of applications to business and economics. We expect that students who are interested in the life sciences will find the V119 material much more engaging. The goal of the course is to add a quantitative dimension to the student's understanding of natural phenomena. Like its M119 counterpart, the course emphasizes real world data presented in tables and graphs. Students will learn to develop mathematical models based on the data. Calculus is introduced as a tool for analyzing these models and hence natural phenomena. This point of view sharply diverges from the traditional view of calculus still taken in the Math M211 course. In Math M211, there is no mention of data and one views calculus as a way of abstractly manipulating functions defined by formulas.

In this syllabus you will find

- a description of the learning objectives, and
- coursewide and university policies.

A course schedule that includes recommended textbook problems will appear separately. Your instructor will provide a 'section syllabus' which describes his or her course policies including information on additional exams, WeBWorK assignments, possible quizzes, and grading information.

LEARNING OBJECTIVES:.

1. Students should become proficient in modeling problems from a variety of applied areas using linear, exponential, logarithmic, and periodic functions. This includes identifying which problems can be solved using such models, creating variables, deducing relationships, solving the resulting mathematical problems, and drawing qualitative conclusions from the numerical solutions.
2. Students should become proficient in calculating, estimating, expressing, and interpreting average, relative, and instantaneous rates of change of one quantity with respect to another, using the language of differential calculus. This includes situations in which the relationship between the quantities takes the form of a table, a graph, a textual description, or a symbolic formula.
3. Students should become proficient in modeling optimization problems in a variety of applied areas. This includes creating independent and dependent variables, translating constraint information into an interval of values for the independent variable, solving the resulting optimization problem using techniques from differential calculus, and drawing qualitative conclusions from the numerical solutions.
4. Students should become proficient in calculating, estimating, expressing, and interpreting the accumulated change of one variable, given its rate of change with respect to another variable, using the language of integral calculus. This includes situations when the relationship takes the form of a table, a graph, a textual description, or a symbolic formula.

This course may satisfy the Mathematical Modeling and the Natural and Mathematical Sciences requirement.

EXAMS: There will be four exams during the semester including a departmental midterm exam and departmental final exam.

- **Missing an exam:** If you (will) miss an exam, e-mail the instructor immediately. An exam can be made-up only if you can prove via documentation that extreme circumstances prevented you from attending the exam.
- **Identification:** You must bring your university picture ID or driver's license with you to each exam.
- **Electronic devices:** Access to a cell phone or another unauthorized electronic device during an exam will result in a course grade of 'F'.

DEPARTMENTAL EXAMINATIONS: The midterm and final are departmental examinations. All students must take these exams at the same time. The dates and times for these examinations were announced in the Schedule below. **By registering for this course you committed yourself to take these examinations at the scheduled times.** If you have a conflict with the midterm exam, you must inform your instructor during the first two weeks of the course. Your instructor will announce the location of these exams during class.

QUIZZES: Periodically, the instructor will administer a quiz during class. Any given quiz might be unannounced. **There are no make-ups for quizzes. Instead, the lowest two quiz scores will be dropped.**

HOMEWORK: Homework will be assigned, collected, and graded using the web based system 'WeBWorK'. You gain access to WeBWorK through your Canvas V119 page. (Log in to canvas → go to V119 → click Assignment → click Webwork → click "load Webwork in a new window") **There are no make-ups for late homeworks.** Instead, we will have a bonus webwork at the end of the semester.

After each class, you should also try to solve each of the recommended textbook exercises (listed next page) associated with the section covered in class. If you aren't able to complete solve a problem, then you should get help by, for example, going to the instructor's office hours. Your solutions will not be collected nor graded, but *exam questions will be based on problems in the text.* You can find a list of recommended textbook problems later in this syllabus.

GRADING: At the end of the semester you will receive a letter grade for the course that is based on your performance in various ways. The various components will contribute as follows:

| | |
|--------------|-----|
| Exam 1 | 15% |
| Midterm exam | 22% |
| Exam 3 | 15% |
| Final Exam | 28% |
| Webwork | 15% |
| Quizzes | 5% |

Below are the course percentages that will guarantee a particular letter grade:

| | | | |
|-------------|----|-------------|----|
| 97 or above | A+ | 77 or above | C+ |
| 93 or above | A | 73 or above | C |
| 90 or above | A- | 70 or above | C- |
| 87 or above | B+ | 60 or above | D |
| 83 or above | B | Below 60 | F |
| 80 or above | B- | | |

CALCULATORS: Each student is expected to have and be able to use a graphing calculator equivalent to a Texas Instruments TI-83 or TI-84, the models that the department recommends and supports. (The

TI-82 and TI-86 are, for example, equivalent for the purposes of this class. A student may not use a TI-89, TI-92, or, more generally, any calculator with a Computer Algebra System (CAS.) Each individual student is required to have a calculator for exams. There are calculator tutorials located on Canvas. Individual instructors may require additional equipment for their sections of the class.

HELP: Assistance will be available to all students in M119 as follows:

- **Departmental M119 Help Sessions: Swain East 340, Monday-Thursday 5-7pm.**
- Free tutorial help: Sunday through Thursday, 7:00–11:00 p.m., Academic Support Centers in Briscoe, Forest, and Teter. Sessions start on Monday, August 27. More information at http://www.indiana.edu/~acadsupp/regular_services.shtml.
- ‘M119 Tube’ Instructional videos, including worked examples, can be found on Canvas.
- Cinema M119 videos can be found at <https://www.youtube.com/user/CinemaM119>.

RELIGIOUS OBSERVANCES: Students with conflicts between course requirements (e.g. examinations) and religious observances must contact their instructor during the first two weeks of the term and follow the procedures outlined by campus policy, available at https://www.indiana.edu/~vpfaa/academicguide/index.php/Policy_H-10.

ACADEMIC INTEGRITY: The Mathematics Department expects its students to obey fully the University policies on academic integrity. The usual penalty for a student caught cheating in V119 includes a final grade of F. Further penalties may include probation, suspension, or expulsion from the University. Cheating cases are always reported to the Office of Student Ethics.

SEXUAL MISCONDUCT: One of your instructor’s responsibilities is to create a positive learning environment for all students. Title IX and IU’s Sexual Misconduct Policy prohibit sexual misconduct in any form, including sexual harassment, sexual assault, stalking, and dating and domestic violence. If you have experienced sexual misconduct, or know someone who has, the University can help. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with:

- The Sexual Assault Crisis Services (SACS) at (812) 855-8900 (counseling services)
- Confidential Victim Advocates (CVA) at (812) 856-2469 (advocacy and advice services)
- IU Health Center at (812) 855-4011 (health and medical services)

You are encouraged to visit <http://stopsexualviolence.iu.edu> to learn more.

Schedule and highly recommended problems, Spring 2019

Text: *Applied Calculus, Fifth Edition*, by Hughes-Hallett *et al.*

| | Date | Section | Problems/Notes |
|--------|--------|---------|--|
| Week 1 | Jan 13 | 1.1 | 1,3,6,7,8,11,13,14,15,16,17,18,19, 21, 22,23,24,27,29,33 |
| | Jan 15 | 1.3 | 1,3,5,7,9,15,16,19,20,22,27,28,30,31,35,37 |
| | Jan 17 | 1.2 | 1,3,5,7,11,13,14,25,26,27,28,30,31 |
| Week 2 | Jan 20 | | MLK Day, no class |
| | Jan 22 | 1.5 | 1,2,3,5,7,9,11,17,18,19,27,30,35 |
| | Jan 24 | 1.6 | 3,11,13,15,17,19,21,25,29,31,33,35,40,44 |
| Week 3 | Jan 27 | 1.7 | 2,8,9,10,11,13,15,16,19,20,23,24,26,29,30 |
| | Jan 29 | 1.8 | 1,3,5,7,11,12,13,15,21,23,25,27,29,30,31,38,40,43,45,47,48,49,52 |
| | Jan 31 | 1.9 | 1,3,5,7,8,9,11,12,14,18,19,20,21,22,24,25,26 |
| Week 4 | Feb 3 | 1.10 | 1,2,3,6,7,9,10,11,13,15,17,18,21,22,25,30,31 |
| | Feb 5 | Review | <i>pp 78-84:</i> 4,9,11,12,15,16,17,19,25,27,29,45,47 |

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|---------|-----------|---------|--|
| | | | 49,53,59,67,68,77,78,79,80,82,85,86 |
| | Feb 7 | Exam 1 | in usual classroom at usual class time |
| Week 5 | Feb 10 | 2.1 | 1,3,6,8,9,11,12,13,15,17,19,20 |
| | Feb 12 | 2.2 | 1,3,5,7,9,10,13,15,17,18,19,20,21,22,23,25,28 |
| | Feb 14 | 2.3 | 3,5,8,9,16,19,21,24,25,26,27,29,33,34,36,37,38,39,40,41,45 |
| Week 6 | Feb 17 | 2.4 | 1-13 odd,18,20,21,23,25,29,31 |
| | Feb 19 | 3.1 | 1-11 odd, 21-33 odd, 39, 41, 43, 47, 51, 52, 63 |
| | Feb 21 | 3.2 | 5,7,9,15-27 odd,36,37,39,48,50,54 |
| Week 7 | Feb 24 | 3.3 | 3-21 odd,22,23,25,27,31,33,34,39,41,43,45 |
| | Feb 26 | 3.4 | 3,7,13,15-17,20,22,25,29,35,37 |
| | Feb 28 | 3.5 | 1-21 odd,24,25,29,30 |
| Week 8 | Mar 2 | 4.1 | 1,3,5,7,9,11,13,15,17,19,23,25,27,30,33,34,37 |
| | Mar 4 | Review | <i>pp 124-128</i> : 1,2,5,9,11,13,15,17,19,21,23,27,29,34,39,40,44,45,46,47 <i>pp 165-168</i> : 1-39 odd,41,43,62,63,65,67 |
| | Mar 6 | Review | |
| | Mar 7 | Midterm | Saturday, 11:00 am - 12:30 am, Location TBA |
| Week 9 | Mar 9 | 4.2 | 1,3,7,9,11,13,17,19,20,23,24,25,27,29,31,32,33,34 |
| | Mar 11 | 4.3 | 3,5,7,9,15,17,19,21,27,29,31,34,39,41,42,45 |
| | Mar 13 | 4.7 | 1,7,8,11,12,13,14,15 |
| | Mar 15 | | Last day for Automatic Withdraw |
| Break | Mar 15-22 | | Spring break, no class |
| Week 10 | Mar 23 | 4.8 | 1,3,8,9 |
| | Mar 25 | 5.1 | 1,2,3,5,7,8,11,13,15,17,21,22,28 |
| | Mar 27 | 5.2 | 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29 |
| Week 11 | Mar 30 | 5.3 | 1,3,5,6,7,8,9,11,13,19,23,25,27,33 |
| | Apr 1 | 5.4 | 1,3,5,8,11,13,16,17,19,21,23,24,28,30,31,33,35 |
| | Apr 3 | 5.5 | 1,4,6, and supplemental worksheet |
| Week 12 | Apr 6 | 5.6 | 1,3,5,7,9,12,15,17,18,19,23 |
| | Apr 8 | Review | <i>pp 228-235</i> : 1,3,5,7,9,11,13,15,19,21,27,29, 31,33,36,68,71,75,77 <i>pp 276-281</i> : 1,3,5,6,11,13,15,17,19,21,23,25, 29,31,33,34,35,36,37,49,50,51,52,53,57,59 |
| | Apr 10 | Exam 3 | in usual classroom at usual class time |
| Week 13 | Apr 13 | 6.1 | 1,3,5,7,9,11,13,15,17,19,21,23,26,27,28 |
| | Apr 15 | 6.2 | 1,3,5,15,17,19,21,23,25,27,29,31,33,35,38,39, |
| | Apr 17 | 6.2 | 45,47,49,53,55,57,59,61,63,65,67,69,71,73,75,87,89 |

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| Week 14 | Apr 20 | 6.3 | 1,3,5,7,9,11,13,15,17,19,21,23,25, 32, 33 |
| | Apr 22 | 6.6 | 3,5,7,9,11,13,15,17,19,21,23,25,27,29,31 |
| | Apr 24 | 6.6 | 33,35,37,39,41,43,45,47,51,55,57,59,61 |
| Week 15 | Apr 27 | 6.7 | 1,3,5,7,9,11,13,15,17,19,23,26 |
| | Apr 29 | Review | <i>pp 324-326</i> : 1,3,5,7,9,11,13,15,17,19,21,23,25 |
| | May 1 | Review | 27,29,31,33,35,37,39,56,57,59,61,63,65,67,69,71,73. |
| Final | May 8 | Final | Friday 5:00pm-7:00pm, Location TBA |

Summary of some important dates:

- Midterm examination, Saturday, March 7, from 11:00 am to 12:30 pm.
- Last day to withdraw with grade of 'W': Sunday, March 15.
- Final examination, Friday, May 8, from 5:00 pm to 7:00 pm.