

# AMS 261: Applied Calculus III (Multivariable Calculus)

Fall 2018

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## Course Information

- Instructor: Matthew G. (Matt) Reuter, Ph.D.  
Email: [matthew.reuter@stonybrook.edu](mailto:matthew.reuter@stonybrook.edu)  
Office Hours: Mondays, 1 – 2 pm and Fridays, 9:30 – 10:30 am in IACS L155, or by appointment.
- Lecture Time: Mondays, Wednesdays, and Fridays, 11 – 11:53 am in ESS 001.  
Recitations: R01, Mondays, 5:30 – 6:53 pm in Melville Library E4330.  
R02, Wednesdays, 2:30 – 3:23 pm in Javits 101.  
R03, Tuesdays, 4 – 4:53 pm in Melville Library E4320.  
R04, Tuesdays, 10 – 10:53 am in Frey 201.
- Textbook: Multivariable Calculus (11th ed.) by Larson & Edwards **or** chapters 11–15 of Calculus (11th ed.) by Larson & Edwards. **Cengage Unlimited** is recommended.
- Resource: WebAssign access is required. **Make sure to purchase access using your Stony Brook email address.** You may experience access problems if you do not.
- Prerequisites: AMS 161 or MAT 127 or MAT 132 or MAT 142.
- Recitation  
TAs: Jacob (Jake) Crosser, B.Sc., [jacob.crosser@stonybrook.edu](mailto:jacob.crosser@stonybrook.edu),  
Office Hours: Fridays, 2:30 – 4:30 pm in Harriman 132, or by appointment.  
David N. Kraemer, B.A., [david.kraemer@stonybrook.edu](mailto:david.kraemer@stonybrook.edu),  
Office Hours: Thursdays, 10 am – 12 noon in Harriman 132, or by appointment.
- Graders: Alexander (Alex) Collado, [alexander.collado@stonybrook.edu](mailto:alexander.collado@stonybrook.edu),  
Office Hours: Tuesdays, 5:30 – 7:30 pm in Harriman 132.  
Hana Ghobashy, [hana.ghobashy@stonybrook.edu](mailto:hana.ghobashy@stonybrook.edu),  
Office Hours: Mondays, 3 – 5 pm in Harriman 132.  
Jingyi Liu, [jingyi.liu.1@stonybrook.edu](mailto:jingyi.liu.1@stonybrook.edu),  
Office Hours: Mondays, 2 – 3 pm and Wednesdays, 1 – 2 pm in Harriman 132.  
Srinija Nalluri, [srinija.nalluri@stonybrook.edu](mailto:srinija.nalluri@stonybrook.edu),  
Office Hours: Wednesdays and Thursdays, 12 noon – 1 pm in Harriman 132.  
Liu (Jason) Tan, [liu.tan@stonybrook.edu](mailto:liu.tan@stonybrook.edu),  
Office Hours: Wednesdays, 5:15 – 7:15 pm in Harriman 132.  
Brett Weinger, [brett.weinger@stonybrook.edu](mailto:brett.weinger@stonybrook.edu),  
Office Hours: Tuesdays and Thursdays, 2 – 3 pm in Harriman 132.
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## Course Description & Learning Objectives

Vector algebra and analytic geometry in 2- and 3-dimensions: multivariable differential calculus and tangent planes; multivariable integral calculus; optimization and Lagrange multipliers; vector calculus including Green's and Stokes's theorems.

A student who successfully completes this course should demonstrate

1. An understanding of vector algebra and the geometry of two- and three-dimensional space.
  2. An understanding of scalar functions in several dimensions, and the application of differential and integral calculus to multivariable functions.
  3. An understanding of the fundamental concepts of vector calculus and integral theorems.
  4. The ability to communicate and translate mathematical concepts and models to real world settings. This includes explaining key concepts in written English.
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## Policies

Attendance at lectures will not be taken. Silence your phone (and other electronic devices) before lecture.

Extra credit will not be given. **Do not ask.**

This course will discuss both mechanical operations (such as evaluating a multiple integral) *and* core concepts/applications. Homework and exams will include both items.

## Information Dissemination

This course uses Blackboard (<https://blackboard.stonybrook.edu>) for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. If you are unsure of your NetID, visit <https://it.stonybrook.edu/help/kb/finding-your-netid-and-password> for more information. You are responsible for having a reliable computer and Internet connection throughout the term. **Caution! You may be at a disadvantage if you attempt to complete all coursework on a smart phone or tablet.** It may not be possible to submit the files required for your homework assignments.

Course materials posted to Blackboard include:

- This syllabus (updated, if needed).
- Supplemental resources.
- Homework and other assignments.

## Communication

Course-related questions should be posted to the appropriate forum in the course discussion boards on Blackboard. For personal/private issues, my preferred method of contact is via the email listed at the top of this syllabus. If you use Blackboard's Email Tool, it will automatically include your full name, course name, and section when you send me an email. I strive to respond to your emails as soon as possible, but please allow between 24–48 hours for a reply. Your Stony Brook University email must be used for all University related communications. You must have an active Stony Brook University e-mail account and access to the Internet. All instructor correspondence will be sent to your SBU e-mail account. Please plan on checking your SBU email account regularly for course related messages. To log in to Stony Brook Google Mail, go to <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password.

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## Grade Structure

Your grade will be determined using the weights:

Homework	17%
Challenge Problems	5%
Exam 1	26%
Exam 2	26%
Exam 3	26%

There is no pre-established scale or curve for determining letter grades. I anticipate that the median score will be a “B”; however, this is subject to change. Factors that may influence such a decision include (but are not limited to) class-wide

- participation in lecture, recitation, review sessions, and/or office hours.
- use of the Blackboard discussion forums for asking and answering questions.
- attempts and on-time submissions to all homework and challenge problem assignments.

### Homework

Homework is designed to reinforce and supplement material covered in the lectures, and will be turned in approximately once per week. Homework will be graded for completion (did you attempt all problems?) and/or for accuracy (did you complete them correctly?). Your lowest two homework scores will be dropped before calculating final grades. **Late homework will not be accepted, even for partial credit.** (Because the lowest two scores are dropped, missing a homework due to illness should not be a problem.)

Most homework assignments will be “tiered”, having easy and hard versions. There will not be a penalty for completing the easy versions instead of the hard versions. To encourage you to try the hard versions, you will receive a bonus percentage point at the end of the semester if you turn in at least 33% (1/3) of the hard versions and two bonus percentage points if you turn in at least 67% (2/3) of the hard versions. **A note on this style of homework:** The tiered homework is designed to give you flexibility in demonstrating proficiency or mastery of the AMS 261 material. Problems with similar difficulty to both versions will appear on exams, meaning you are strongly encouraged to work through all homework problems (even though some will not be turned in). Complete understanding of the easy versions is intended to correspond to a “B” average at the end of the semester, whereas a thorough understanding of the hard versions should lead to an “A” average. As a rough rule of thumb,

- The easy version will emphasize mechanical techniques.
- The hard version will emphasize core concepts and applications.
- Both versions will have problems on mechanical techniques and core concepts/applications.

Homework must be submitted as instructed. In most cases, this will be through

- WebAssign (mostly for mechanical problems).
- Blackboard as a single PDF file (unless otherwise specified) for core concept/application questions. Legible, handwritten solutions that are scanned into a single PDF file are fine.

Hard copies of homework assignments will not be accepted (unless requested). **Homework that is improperly submitted or unreadable will not be graded and will not receive credit.**

You are welcome (and encouraged) to work with other AMS 261 students on homework assignments. However, you must independently write up and submit your own solutions, using your own words. If applicable, you must specify other students with whom you worked and any outside resources used in preparing your solutions. You may not consult solutions to previous semesters' homework assignments. **Failure to follow these rules will be interpreted as academic dishonesty and will be referred to the Academic Judiciary.**

## Challenge Problems

A set of challenge problems will be made available to you when we begin each textbook chapter<sup>1</sup> in lecture. You will submit solutions to **one** of these problems (per chapter) shortly after we finish discussing the chapter in lecture. These problems intentionally blend several core concepts with mechanical techniques. **They are designed to challenge you** and also give you a roadmap of the chapter as we discuss it.

The same policies as homework assignments apply to the challenge problems (e.g., you may work with other AMS 261 students as long as you turn in your own solutions and identify other students with whom you work).

## Exams

There will be three exams: two during the semester and one during finals period. The midterm exams are tentatively scheduled for October 3 and November 5. None of the exams will be comprehensive; however, the material in AMS 261 naturally builds on itself. This means, for example, material from exam 1 will be needed on exam 2, even though it will not be explicitly tested on exam 2.

- Exams will be in-class (lecture or finals period) and closed-book.
- Exams will test both mechanical techniques and core concepts/applications.
- There will be optional, “second-chance” exams administered during finals period for you to demonstrate improvement on exam 1 and exam 2 material (if desired).

Exams must be taken at the specified times. Exceptions will only be given for excused absences; please give as much notice as possible if you need alternate arrangements.

## Grading Policy

Exams written in pencil will be ineligible for regrade requests. Regrade requests must be made within one week of the homework or exam being returned to the class. Note that the entire homework or exam may be regraded, not just the part you request.

## Getting Help

The material in AMS 261 will build on previous concepts throughout the semester. If you have questions about mechanical techniques, core concepts, and/or applications, **do not wait to address them!** There are several resources available to you for getting help:

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<sup>1</sup>Chapters 11 and 12 will be regarded as a single chapter for the challenge problems.

- Asking questions during lecture, recitation, and/or review sessions.
- Posting general questions to the discussion forums on Blackboard.
- Emailing the instructor and/or TAs for personal questions.
- Visiting office hours, as listed on the first page of this syllabus.
- Utilizing the Academic Success & Tutoring Center (details below).

Please use the Blackboard discussion forums for general questions instead of emailing the instructor. In this way, the TAs can also respond (possibly quicker than the instructor) and the entire class can see the question and answer. Remember that we are here to help you learn and succeed.

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## Accessibility Support Statement

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact the Student Accessibility Support Center, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>

## Academic Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

**I take academic integrity very seriously and will report every suspected case of academic dishonesty to the Academic Judiciary. Please contact me if you have any questions about academic integrity.**

## Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.

## Academic Success & Tutoring Center

Free academic support services including one-on-one and small group tutoring, peer academic success coaching, a public speaking course, peer assisted learning, and academic success workshops are available for undergraduate students. Learn more about these services by visiting [www.stonybrook.edu/tutoring](http://www.stonybrook.edu/tutoring).

## Student Technology Services

TLT provides academic technology support to all students. If you require assistance with Blackboard or other academic technologies, please contact TLT at: [helpme@stonybrook.edu](mailto:helpme@stonybrook.edu); Phone: (631) 632-9602; Chat; <http://www.stonybrook.edu/helpme> or visit a SINC Site.

Students who need assistance with their personal devices can contact DoIT's service desk at: (631) 632-9800, submit an online request, or visit the Walk In Center on the 5th floor of the Melville Library (West Campus), Room S-5410. For more information, visit: <https://it.stonybrook.edu/students>

For assistance **after 5 PM or over the weekend**, please contact the Open SUNY help desk at 1-844-673-6786 or [OpenSUNYHelp@suny.edu](mailto:OpenSUNYHelp@suny.edu)

## Tentative Lecture Schedule

This schedule may change without notice. The dates listed in the left column are Mondays.

<b>W1 8/27</b>	Course overview; vectors; 3D geometry (lines & planes). (§§11.1–11.5) Recitation 1: Projections and applications.
<b>W2 9/3</b>	3D geometry (surfaces); coordinate systems; regions. (§§11.6–11.7, supplements) <b>No class on Monday, 9/3:</b> Labor Day recess. Recitation 2: Satellites and space stations (application of 3D geometry).
<b>W3 9/10</b>	Vector-valued functions; differentiation; integration; applications. (§§12.1–12.4) Recitation 3: Drone flight (application of vector-valued functions).
<b>W4 9/17</b>	Functions of several variables; limits; continuity. (§§13.1–13.2) Recitation 4: Working with functions of several variables.
<b>W5 9/24</b>	Partial derivatives; differentiability; chain rule. (§§13.3–13.5) Recitation: Exam review.
<b>W6 10/1</b>	Exam review; Exam 1; directional derivatives; gradient vector. (§§13.6–13.7) <b>Exam 1 in lecture on Wednesday, 10/3.</b> Recitation 5: Applications of directional derivatives.
<b>W7 10/8</b>	Extrema; absolute extrema; constrained optimization. (§§13.8–13.10) <b>No class on Monday, 10/8 or Tuesday, 10/9:</b> Fall break recess. Recitation 6: Optimization and applications.
<b>W8 10/15</b>	Iterated integrals; double integrals; area; volume; polar coordinates. (§§14.1–14.3) Recitation 7: Population density (application of double integrals).
<b>W9 10/22</b>	Applications (double integrals); triple integrals; coordinate systems. (§§14.4, 14.6–14.7) Recitation 8: Star volume (application of triple integrals).
<b>W10 10/29</b>	Jacobians; vector fields; vector derivatives; exam review. (§§14.8, 15.1) Recitation: Exam review.
<b>W11 11/5</b>	Exam 2; line integrals; arc length; curvature. (§§15.2, 12.5) <b>Exam 2 in lecture on Monday, 11/5.</b> Recitation 9: Flow diagrams.
<b>W12 11/12</b>	Line integrals; path independence; Green's theorem. (§§15.2–15.4) Recitation 10: Evaluating line integrals.
<b>W13 11/19</b>	Parametric surfaces. (§15.5) <b>No class on Wednesday, 11/21; Thursday, 11/22; or Friday, 11/23:</b> Thanksgiving recess.
<b>W14 11/26</b>	Surface integrals; surface area; flux integrals. (§§14.5, 15.6) Recitation 11: Evaluating surface and flux integrals.
<b>W15 12/3</b>	Divergence theorem; Stokes's theorem. (§§15.7–15.8) Recitation: Exam review.
<b>W16 12/10</b>	Summary; exam review. <b>Regular classes only held on Monday, 12/10.</b>
<b>Finals Period</b>	Exam 3 and the “second-chance” exams will be given as scheduled by the registrar: Friday, 12/14 from 11:15 am – 1:45 pm (this is subject to change by registrar).