Calculus III: Multivariable Calculus, Fall 2020

- **Instructor**: Professor Chris Kottke
- **Email**: `ckottke@ncf.edu`
- **Phone**: 914-487-4516
- **Office**: HNS 104
- **Office Hours**: M, Th, 8:30-9:30pm on Zoom; W, F, 11am-12pm in HNS 104 or Zoom.
- **Lectures**: MWF 10:00-10:50, live on Zoom, with recordings made available on Canvas.
- **Workshop**: W 2:00-3:20, in person in HNS 106 and by Zoom
- **Textbook**: Calculus, by James Stewart, 8th ed. (Any version with chapters 12-16).

Course Description: This class is a continuation of Calculus I and II. We will cover the calculus of functions of several variables and vector-valued functions, including maximization/minimization; directional derivatives; gradient, curl and divergence; line, surface and volume integrals; and the classical theorems of vector calculus: Green's Theorem, Stokes' Theorem and the Divergence Theorem.

Reading Assignments: A reading assignment for each class will be posted on the course webpage and in the Canvas course prior to each lecture. This reading is best completed *before* the lecture. Unless otherwise specified, you will be responsible for all material in the reading assignment, even if it is not covered in lecture. A provisional lecture schedule appears below.

Homework: Homework problems will be assigned after each lecture in order for you to practice and gain facility with the material. A selection of three to four of these problems will be collected weekly to provide feedback. *Note*: while you will receive scores on your returned homework, *these numerical homework scores will not be used in your final evaluation*; only your homework participation rate matters for evaluation purposes. This gives you a safe and low stakes opportunity for a regular appraisal of your performance leading up to the exams.

Workshop: An additional problem set will be given in the optional weekly workshop, providing an opportunity for additional practice and real time assistance. Along with office hours, this is also a good time to get help with homework problems.

Exams: There will be two in-class midterm exams, and a cumulative final. Dates are as follows:

- Exam 1: Friday, September 25
- Exam 2: Wednesday, October 21
- Final exam: TBD during finals week (December 2-8)

Assessment: Your course performance (Sat/Unsat) will be assessed based on the following criteria, in descending order of significance:

- Exam scores (25% Exam 1, 25% Exam 2, 50% Final Exam).
- Homework completion (equal in weight to one midterm exam).
- Participation, effort, and growth.

You are always encouraged to check in if you have any concerns.

Tips for Success: These are based on the experience of past students in this class.

- **Have a growth mindset**: Mathematics is a skill like any other which is developed through regular practice, contrary to the false but prevalent notion that you are either "good at it" or "bad at it". This course in particular relies on two complementary sets of skills: visual/geometric and algebraic/computational. Use the opportunity to lean on whichever of these is stronger for you as you build up the weaker one.
- **Do homework problems early and often**: As with any kind of practice, frequency is key. You are much better off spending 30 minutes every day than 5 hours once per week. Working the problems will also let you quickly isolate the points you don't understand as well.
- **Identify questions and bring them to office hours or workshop**: Having questions and working through confusion is how you learn this material, and the opportunity to have your questions answered is what makes the class more valuable than just a book or a set of video lectures.
- **TL;DR**: Every student who has regularly tried all the homework problems and regularly had their questions addressed has passed this class.

Policies: Students in need of academic accommodations for a disability may consult with the office of Students Disability Services (SDS) to arrange appropriate accommodations. Students are required to give reasonable notice prior to requesting an accommodation. Students may request an appointment with SDS in-person (HCL3), via phone at 941-487-4496 OR via email at `disabilityservices@ncf.edu`.

No student shall be compelled to attend class or sit for an examination at a day or time when they would normally be engaged in a religious observance or on a day or time prohibited by his or her religious belief. Students are expected to notify their instructors if they intend to be absent for a class or announced examination, in accordance with this policy, well in advance of the scheduled meeting.

Lecture Schedule:

Monday	Wednesday	Friday
8/24: 12.1, 12.2, 12.3: Vectors, dot prod	**8/26**: 12.4, 12.5: Cross prod, lines, planes	**8/28**: 12.6: Surfaces
8/31: 13.1, 13.2: Curves and velocity	**9/2**: 13.3: Arc length	**9/4**: 14.1: Multivariable functions
9/7: Labor Day	**9/9**: 14.2, 14.3: Limits, partial derivatives	**9/11**: 14.4, 14.5: Tan. planes, chain rule
9/14: 14.6: Gradient	**9/16**: 14.7: Local extrema	**9/18**: 14.8: Lagrange Multipliers
9/21: 14.7, 14.8 Extrema continued	**9/23**: Review	**9/25: *Exam 1***
9/28: 15.1: Double integrals	**9/30**: 15.2: Integrals over regions	**10/2**: 15.3: Polar coordinates
10/5: 15.4: Applications	**10/7**: 15.6: Triple Integrals	**10/9**: 15.7: Cylindrical coordinates
10/12: Fall Break	**10/14**: 15.8: Spherical coordinates	**10/16**: 15.6-15.8: Triple integral wrap-up
10/19:: Review	**10/21: *Exam 2***	**10/23**: 16.1: Vector fields
10/26: 16.2: Line integrals	**10/28**: 16.3: FTCLI	**10/30**: Green's Theorem
11/2: 16.5 Curl and divergence	**11/4**: 16.6: Surfaces and area	**11/6**: 16.7: Surface integrals
11/9: 16.6, 16.7: Surfaces cont'd	**11/11: Veteran's Day**	**11/14**: 16.8: Stokes' Theorem
11/16: 16.9: Divergence Theorem	**11/18**: 16.8, 16.9 Stokes'/Div. cont'd	**11/20**: Review
11/23: Review	**11/25**: Review	**11/27: Thanksgiving**