

MA-113-D: Calculus II - Spring 2025 Syllabus

Department of Mathematics, Albert Nerken School of Engineering
The Cooper Union for the Advancement of Science and Art

Instructor	Robert Smyth, Professor, Mathematics. See faculty.cooper.edu/smyth for office hours and contact information.
Class Hours	Tuesdays 2-4:50 PM (Room 104), Thursdays 6-7:50 PM (Room 104)
Catalog Description	Applications of definite integrals: area, volume, improper integrals, work, arc length, surface area, centroid. Polar coordinates. Parametric curves in two and three dimensions: velocity, speed and acceleration. Partial derivatives and the chain rule, properties of the gradient. Maxima and minima. Sequences and series: convergence of sequences and series, Taylor and Maclaurin series, power series. <i>4 credits. Prerequisite: Ma111; prerequisite or corequisite: Ma110</i>
Textbook	Thomas, Weir, and Hass, “Thomas’ Calculus”, 12 th edition, Pearson (2009), ISBN-13: 978-0321587992
Online Resources	faculty.cooper.edu/smyth/TC2/toolDirectory.php faculty.cooper.edu/smyth/TechCompanion/Calc2/TechCompanion_Calc2.htm
Course Objectives	<ol style="list-style-type: none">1. Apply the definite integral to solve problems in geometry, physics, and other fields.2. Introduce the differential calculus of functions of several variables and solve multi-variable constrained optimization problems.3. Develop the mathematical theory of sequences and series.
Course Topics	<ol style="list-style-type: none">1. Parametrization of plane curves (11.1). Calculus with parametric curves (11.2, pp. 618-624). Arc length (6.3).2. A review of Vector Algebra (Ch. 12.1-5). Curves in space and their tangents (13.1). Integrals of vector functions (13.2).3. Arc length in space (13.3). Curvature and normal vectors of a curve (13.4). Tangential and normal components of acceleration (13.5).4. Volumes using cross-sections (6.1). Volumes using cylindrical shells (6.2). Areas of surfaces of revolution (6.4, 11.2, pp.624-625).5. Work and Fluid forces (6.5). Moments and centers of mass (6.6). Polar coordinates (11.3).6. Graphing in polar coordinates (11.4). Areas and lengths in polar coordinates (11.5). Conic sections (11.6).7. Conics in polar coordinates (11.7). Velocity and acceleration in polar coordinates (13.6).8. Sequences (10.1). Infinite series (10.2). The integral test (10.3).9. Comparison tests (10.4). The ratio and root tests (10.5). Alternating series. Absolute and conditional convergence (10.6).10. Power series (10.7). Taylor series (10.8). Convergence of Taylor series (10.9).11. The binomial series and Applications of Taylor series (10.10). Complex numbers and Euler’s formula (Ap. 7). Function in several variables (14.1).12. Cylinders and quadratic surfaces (12.6). Limits and continuity (14.2). Partial derivatives (14.3).

13. The chain rule (14.4). Directional derivatives and gradient vectors (14.5). Tangent planes and differentials (14.6).
14. Taylor's formula for two variables (14.9). Extremal values and saddle points. (14.7). Lagrange multipliers (14.8).

Tutoring

Tutoring is available for this course both through the Math Help Room (Rm 409: T 7-8pm, W 5-6pm, Th 1-2pm), and via individual tutoring. Click [here](#) for current scheduling information for one-on-one tutoring.

Assessment

Your term grade will be determined by homework (6%), three midterms (21% each) and a cumulative final exam (31%). Homework problems and due dates are listed online at faculty.cooper.edu/smyth/ma113new/hw.htm. The exams will test your familiarity with the principles of the subject with routine problems and your ability to extrapolate creatively from these principles on challenging problems. See the section on **Grades of Record** at cooper.edu/engineering/curriculum/academic-standards-regulations for the letter grades used for this course and their proper interpretation. The exam schedule is posted at <http://faculty.cooper.edu/smyth/ma113new/ma113.htm>.

Homework Policies

You may work individually or in groups of at most three students on the main (*i.e.* non-WeBWork) homework assignments. A group must make a single joint submission with all team members listed at the top of the front page. In the case of a group submission all members will receive the same grade for the assignment. You should make sure you understand all the solutions your team is submitting, even if other team members came up with them. Any assistance you (or your group) receives and all sources you use in preparing your homework assignments must be properly credited in writing on your submission. Groups may be re-formed on an assignment-by-assignment basis. The main homework assignments must be submitted at the beginning of the class period on the assignment due date. Each of these assignments includes all problems from the list at faculty.cooper.edu/smyth/ma113new/hw.htm not previously submitted up to and including those pertaining to the last section completed during the last **Tuesday** class meeting prior to the assignment due date. Select problems from each assignment will be graded according to the rubric posted at faculty.cooper.edu/smyth/ma113new/calchWgradingRubric.pdf. Credit will not be awarded for late submissions. However your lowest homework grade will be dropped. There will also be a relatively small number of additional exercises assigned through WeBWork. Due dates for these assignments appear on the site.

Exam Policies

All exams are closed book / closed notebook exams. You may use a basic scientific calculator, but no graphing or programmable calculators, computers, cellphones, books, notebooks, or other resources may be used. Bring a pencil or pen on the day of the exam. Adequate paper will be provided. You may not use your own paper. No pages, including extra pages for scratchwork, should be removed from a stapled exam packet. Exams are timed. Your score may be reduced if you do not stop working on your exam after time has been called. If you choose to leave the exam room during the exam period you will not be permitted to resume working on the exam after returning. Registered students must sit for the course examinations on the scheduled day and time. Failure to do so will generally result in forfeiture of the percentage credit allotted to the missed exam. Students who have medical excuses for missing an exam should contact

the Dean of Students promptly. Failure to register a request for a medically excused absence in a timely manner with the Dean of Students may complicate and potentially invalidate the request. Any student requesting a medically excused absence must provide the Dean of Students with documentation from a medical provider justifying the absence. The Dean of Students will inform me when an absence is due to a valid medical issue/condition so that the absence can be considered excused. In the event of an excused absence, the student must schedule an oral makeup exam with me as soon as is possible.

ADA Accommodations

If you believe you are entitled to an accommodation through the Americans with Disabilities Act you must self-identify to the Office of Student Affairs, and meet with me during the first or second week of the term to discuss arrangements for meeting your accommodation. Cooper Union has limited resources and extra time may be required for accommodation arrangement to be feasible. If you are entitled to an accommodation on exams, you must confirm exam accommodation arrangements with me (in writing via email) two weeks prior to *each* exam. Please detail any scheduling constraints in your accommodation arrangement confirmation emails. Students will not be afforded any special accommodations retroactively, i.e., for academic work completed prior to disclosure of the disability to me. Support services for students are described [here](#).