

# MATH 2004 E – Winter 2020

## Multivariable Calculus for Engineering or Physics

**Instructor:** Jason Crann

**Office:** Herzberg 4201

**Office Hours:** Friday, 11:00-13:00

**Email:** jasoncrann@cunet.carleton.ca

**Course Dates:** Jan. 6 – Apr. 7, 2020

**Lectures:** Wednesday/Friday, 8:35–9:55, Tory Building 360

**Tutorials:** Friday, 14:35–15:25

**TAs:**

E1: Abitalib Kagalwala (abitalibkagalwala@gmail.carleton.ca)

E2: Francisco Villacis (franciscovillacis@gmail.carleton.ca)

E3: Liam Bruce (liambruce@gmail.carleton.ca)

E4: Andrew Musgrave (andrewmusgrave@gmail.carleton.ca)

**Representative Textbook:** Angelo Mingarelli, *The ABC's of Calculus*, Volume 2, Third Edition (2018), Nolan Company. Book available for pick-up in his office (HP 4380), on or after the first day of class. Price: \$100 cash.

**Evaluation:** Best of two schemes:

Scheme 1:

- Tutorial attendance - 10%;
- Tests - 40%, best 4 of 6 tests during tutorials (each worth 10%).
- Final exam - 50%.

Scheme 2: Final exam - 100%.

**Prerequisites:**

- Calculus: MATH 1005 or MATH 2007
- Linear algebra: MATH 1104 or MATH 1107.

Students who have not passed the prerequisite courses may be automatically de-registered during the term. Those that have done poorly in the prerequisites are strongly urged to take MATH 1005 before attempting this course.

**Approximate Course Outline:**

- Vectors, dot product, cross product, triple product, direction cosines, lines and planes, rotations and translations in the plane.
- Planar curves, parametric representation, conic sections, area, length.
- Polar coordinates, limits, continuity, partial derivatives.

- Directional derivatives, gradient, the chain rule, implicit differentiation, tangent planes, normal lines.
- Conservative fields, divergence, curl, line integral.
- Double integrals, volume under a surface, volume of solids of revolution, area of a surface.
- Change of variables in double integrals.
- Parametric equations of a surface, surface integrals. Green's Theorem. Stokes' Theorem.
- Triple integrals, change of variables in triple integrals. Cylindrical, spherical coordinates. The Divergence Theorem.
- Extrema of functions of two variables, Lagrange multipliers.

### Standards/Expectations:

- Students are expected to attend classes and tutorials. It is your responsibility to obtain any missed lecture notes/tutorials from your colleagues. Lecture notes will not be posted online.
- Calculators may be used on tests and the exam, but wireless devices are forbidden.
- Suggested exercises from the textbook will be given. They are not required, but are encouraged to help study.

**Deferred Exam:** Students who miss the final exam may be eligible for a deferral. Application for a deferral must be made, with appropriate documentation, to the Registrar's Office within five business days of the examination.

**Requests for Academic Accommodation:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

- **Pregnancy obligation:** Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)
- **Religious obligation:** Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)
- **Academic Accommodations for Students with Disabilities:** If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. [carleton.ca/pmc](http://carleton.ca/pmc)

- **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: [carleton.ca/sexual-violence-support](https://carleton.ca/sexual-violence-support)
- **Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>