

Faculty of Science Course Syllabus
Department of Mathematics and Statistics

MATH 3045
Curves and Surfaces
Winter 2020

Instructor(s): Suresh Eswarathasan sr766936@dal.ca Chase Building, Rm 316

Lectures: Tuesdays + Thursdays, 11:35-12:55 Life Sciences Center Common Area C244

Laboratories: None

Tutorials: None

Submit course syllabus to your Department office for posting on the Dept website prior to the start of term
Submit requests for final exam exemptions (1000, 2000 and 3000 level courses only) to the Dean's office at least 2 weeks prior to the start of term

Course Description

The subject can be briefly described as the study of geometrical objects (curves and surfaces) defined in Euclidean space 3-space by means of mathematical analysis and linear algebra. The material has a wide range of applications and follow-ups, including areas of pure and applied mathematics (e.g., differential geometry), theoretical physics (e.g., relativity, classical mechanics, etc), computer science and engineering (e.g., computer vision, image recognition).

Course Prerequisites

MATH 2002.03 and (MATH 2040.03 or MATH 2135.03) or consent of instructor

Course Objectives/Learning Outcomes

Students will be able to fluidly apply methods of calculus and linear algebra to problems arising from geometry and will have a firm foundation when entering upper-level courses such as MATH 5530 (Differential Geometry). Furthermore, students will have enough background to enter potential summer research projects centered on topics at the intersection of geometry and analysis.

Course Materials

- Andrew Pressley, *Elementary Differential Geometry*, 2nd Edition, Springer (2012).
- All other materials will be hosted on BrightSpace.

Course Assessment

- Assignments (bi-weekly, usually assigned on Fridays and due in two weeks) = 30%.
- Midterm Exam (tentatively: Thursday, February 13, in class) = 20%.
- Final Exam (to be scheduled by the Registrar) = 50%.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)

A- (80-84) B- (70-72) C- (55-59)

Course Policies

- *Assignments are to be submitted at the beginning of class on the due date.*
- *Late assignments will not be accepted (unless you have a documented excuse, such as a medical or religious one, as per university policies).*
- *It is expected that each student will write up their assignment independently. Students submitting identical assignments will receive a mark of 0 for that assignment.*
- *If you are ill on the day of an exam, you must advise me of this fact before the test, and you will need to submit a Student Declaration of Absence form before you can write a make-up test. Please also read the university policies regarding make-up examinations.*

Course Content

The topics to be covered include regular curves, curvature and torsion, Frenet frames, first and second fundamental forms, Gaussian, mean and principal curvatures; if time permits then geodesics, Gauss' Theorema Egregium, and more will also be covered. The students will benefit from the use of computer algebra systems such as MAPLE, both for symbolic computations and visualization.