FOUNDATION FOR ADVANCED EDUCATION IN THE SCIENCES

MATH 128 – Calculus II – Spring 2020

Instructor:	Caetano Souto Maior	**Time:**	T 17:30 – 20:30
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Course Pages:

1. `http://faesmath.github.io/math128` – general course information and login to online classroom
2. `https://faes.instructure.com/courses/255` – direct login to Canvas course page
3. `https://my.faes.org/secure/student/student.aspx` – FAES student portal

Office Hours: Thursday, 17:00, usual classroom (subject to change)

Textbooks:

- Gregory Hartman, APEXCalculus v4.0 (either Volume 3, or both Q3 and Q4). CreateSpace Independent Publishing Platform [**main textbook, required**]
- James Stewart Calculus: Early Transcendentals (Multivariable or single volume) (2020). Cengage Learning. ISBN: 9781337613927 [**optional textbook**]

Course Description:

This is a continuation of MATH 127. Topics will include application of differentiation and integration to life sciences, differential equations, functions of many variables, partial derivatives, constrained and unconstrained optimization.

Objectives:

- Understand the concept of differential equations and multivariate functions
- Learn how to solve differential equations

Structure of the course:

This course will be divided into three units. The first will consist of a brief review of essential single-variable calculus concepts, parametric equations, and vectors, then introduce calculus on functions of multiple variables, specifically partial derivatives and related applications. Unit two further explores derivatives of multivariable functions and covers integration of these functions, i.e. double, triple, and multiple integrals. Unit three introduces topics of vectors calculus, like line integrals, vector fields, and introduces some important theorems and applications.

The Learning Process:

This course will take into account the diversity of background and stage of career of students taking it, and will try to fill any gaps in single-variable calculus knowledge with the first-lectures review, as well as individually during the office hours. The bulk of the course will be dedicated to topics of a second course in calculus, most of which are more or less straightforward extensions of the main calculus tools to functions of many variables. The last topics in the course will be an overview of more advanced topics, sometimes reserved for a third course in calculus, and the extend and depth of coverage will depend on the specific interests of student individually, and may be explored using applications and small projects. With this approach I expect to be able to cover the second half of the typical calculus curriculum, as found in traditional textbooks.

Prerequisites: Single-variable calculus

Important Dates: Exam dates are subject to change:

Class begins ..... Feb 4, 2020
Last day to drop ..... Feb 21, 2020
Midterm I ..... Mar 3, 2020
Midterm II ..... Mar 31, 2020
Last day to change status ..... Apr 10, 2020
Final evaluations ..... May 5, 2020

Grading Policy:

Midterm 1 (25%), Midterm 2 (25%), Final (30%), Quizzes (20%). Quizzes and exams are cumulative. Extra credit can be obtained up to 10 points. 100 points is the highest grande in this course.

Grading Scale: The grading scale will be the following:

A	A-	B+	B	B-	C+	C	C-	D+	D
93+	$90-92$	$87-89$	$83-86$	$80-82$	$77-79$	$72-76$	$70-72$	$67-69$	$60-66$

Quiz Policy:

Approximately 10 quizzes will be administered in this course, and by the end of the course it is required that each student has taken at least half of them. The higher 50% quantile of scores will make up the final grande contribution. There are no make-up quizzes.

Homework Policy: Homework consists of problems from the required or optional textbooks; it does not count directly towards the final grade, but is strongly recommended as practice for both quizzes and exams.

Extra Credit: The students can earn extra credit in several ways:

1. Pointing out errors in any of the texts or presentations used in the course;
2. Writing 1-2 paragraphs about concepts they find difficult or think require clearer explanation;
3. Asking or replying to lecture-related questions in online classroom;
4. Creating an account in the Stack Exchange Math forum and posting questions about exercises or definitions or replying to questions from others (Please inform the instructor of user name and posts).

Extra credit is limited to one point per week.

Class Policy:

- Attendance in every class is strongly encouraged;
- Quiz and exam problems are not simple repetitions of textbook exercises – attendance is likely to increase familiarity with different styles of problems;
- Computers and regular-sized tablets are allowed in class for note-taking and occasional online consultations, please refrain from using any other resources, and especially social media. Cell phones are not allowed, please silence and put away your phones during class;
- Graphical calculators are neither required nor recommended (Computer Algebra Systems or graphing software may be used in specific cases).

Communication Policy:

- Any questions about lecture content should be asked using the Canvas online classroom platform;
- Preferred (and likely fastest) communication method for other matters is e-mail, replies will normally be sent within 2 workdays;
- Calls and text should be used only in urgent cases via Slack channel/direct contact during business hours (request to be added if you would like to be able to use this platform)

Policy on Academic Integrity from FAES:

Academic Policies: This course adheres to all FAES policies described in the academic catalog and student handbook, including the Academic Integrity policy listed on page 11 of the academic catalog and student handbook. Be certain that you are knowledgeable about all of the policies listed in this syllabus, in the academic catalog and student handbook, and on the FAES website. As a student in this program, you are bound by those policies.

Copyright: All course materials are the property of FAES and are to be used for the student's individual academic purpose only. Any dissemination, copying, reproducing, modification, displaying, or transmitting of any course material for any other purpose is prohibited, will be considered misconduct, and may be cause for disciplinary action. In addition, encouraging academic dishonesty by distributing information about course materials or assignments which would give an unfair advantage to others may violate the FAES Academic Integrity policy. Course materials may not be exchanged or distributed for commercial purposes, for compensation, or for any purpose other than use by students enrolled in the course. Distributions of course materials may be subject to disciplinary action.

Guidelines for Disability Accommodations: FAES is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact Dr. Mindy Maris, Assistant Dean of Academic Programs.

Dropping the Course: Students are responsible for understanding FAES policies, procedures, and deadlines regarding dropping or withdrawing from the course or switching to audit status.

Academic misconduct: Cheating, fabrication or plagiarism by students is not acceptable in any form. If a student is found to be in violation of acceptable conduct by any of the practices below, they will be stripped from the grade of that assignment and potentially others

Cheating is defined as an attempt to give or obtain inappropriate/unauthorized assistance during any academic exercise, such as during examination, homework assignment, class presentation.

Fabrication is defined as the falsification of data, information or citations in any academic materials.

Plagiarism is defined as using the ideas, methods, or written words of another, without proper acknowledgment and with the intention that they be taken as the work of the deceiver. These include, but are not limited to, the use of published articles, paraphrasing, copying someone else's homework and turning it in as one's own and failing to reference footnotes. Procuring information from online sources without proper attribution also constitutes plagiarism.

Tentative Course Schedule: Recommended reading may not align exactly with lecture content. Importance of each section will be emphasized during lectures depending on profile/background of enrolled students and overall progress, and interest in specific applications.

Date	Topic(s)	Reading
Feb 4	**Week 1:** Review of single-variable calculus	1-8 [selected] ($\LaTeX$)
Feb 11	**Week 2:** Parametric equations and polar coordinates	9 ($\LaTeX$)
Feb 18	**Week 3:** Vectors and vector-valued functions	10-11 ($\LaTeX$)
Feb 25	**Week 4:** Partial derivatives, differential equations	11-12 ($\LaTeX$)
Mar 3	**Week 5: Midterm I**	
Mar 10	**Week 6:** Extreme values, Lagrange multipliers	12 ($\LaTeX$), *notes*
Mar 17	**Week 7:** Double interals	13 ($\LaTeX$)
Mar 24	**Week 8:** Multiple integrals	13 ($\LaTeX$)
Mar 31	**Week 9: Midterm II**	
Apr 7	**Week 10:** Vector calculus I	14 ($\LaTeX$), *notes*
Apr 14	**Week 11:** Vector calculus II	14 ($\LaTeX$), *notes*
Apr 21	**Week 12:** Topics in multivariable calculus	*notes*
Apr 28	**Week 13:** Topics, applications, review	selected chapters, *notes*
May 5	**Week 14:** Final evaluations	

Additional learning resources:

Khan Academy https://www.khanacademy.org/math/multivariable-calculus

MIT Open Courseware

https://ocw.mit.edu/courses/mathematics/18-02-multivariable-calculus-fall-2007/