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MAC 3474, Calculus III Honors online, Syllabus

Description and Goals

Course Text: S.V. Shabanov, Concepts in Calculus III (University Press of Florida, 2012). The latest edition of the textbook (2019) can be viewed here:

Textbook: S.V. Shabanov, Concepts in Calculus III (2019)

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Lectures

The course is an **asynchronous online class.** This means that all lectures are prerecorded and can be viewed at any time, and multiple times if needed. The viewing schedule will be posted in the course page together with the links to the lectures. The lectures are typically longer that 50 minutes because they include discussions of additional examples illustrating the concept(s) presented in the lecture. This is also meant to cover in part for weekly in-class discussion sessions and typical questions asked in the past during in-person office hours. In addition, there will be Zoom Q&A sessions each week to clarify any conceptual and/or homework questions on lectures posted for each week (the time and the number of session per week will be set after the course starts). The link to the Zoom sessions will be posted in Canvas and in the course page. This course has never been delivered online before. So, given the lack of classroom discussions of the main concepts during lectures, you might find this course difficult (or boring) to follow at times if your knowledge of the prerequisites or your motivation is not up to a needed level. Zoom sessions are meant to help, but, unfortunately, they have been found not as effective as in-class discussions. You would have to motivate yourself more than usual in order to follow online lectures rather than to have a lively discussion and, hence, work more.

Course Content: The course includes the following main topics: Vector algebra, Euclidean spaces, geometry of lines and planes in space, basic theory of quadric surfaces, vector functions and curves in space, basic geometry of curves in space (tangent vector, curvature, and torsion), functions of several

variables, limits and continuity, differentiability and partial derivatives, extreme values of a function of several variables, the method of Lagrange multipliers, Riemann integration theory, multiple and repeated integrals, transformations, Jacobian of transformation, change of variables in multiple integrals, integrals over curves and surfaces, improper multiple integrals, vector fields, conservative vector fields, line integrals of a vector field, flux of a vector field, Green's and Stokes' theorems, the divergence (Gauss-Ostrogradsky) theorem. All concepts of the course will be illustrated by real-life problems as a (historical) motivation for developing multivariable calculus.

Goals: Some key topics of the course, such as differentiability, integration theory and vector fields, will be studied more rigorously and deeper than in a regular Calculus 3 course. The aim is to prepare the students for upper division (advanced) mathematics classes. The students are also expected to read and analyze Study Problems in the textbook in addition to the material discussed during class meetings. The Study Problems are meant to facilitate a deeper understanding of the key concepts rather than to teach technical tricks. Most concepts of the course are essential to understand mathematics used in advanced physics and engineering classes.

Placement Test: There will be a placement test (a university policy for the Calculus 3 Honors course). The exam covers basic topics of UF Calculus 1 & 2 or their equivalents. It will be online and organized in the week before the semester starts. The exam will be posted in Canvas and in **the course page**. It will be open for 3 hours. This time includes also any time you need to prepare your submission. Your submission must be uploaded via Canvas. It will automatically rejects any late submissions. It is a free response test. Pick any problem from the test, mark its number, write your solution with ALL technical details clearly indicating how the final answer is obtained. Box the final answer. Do the same for as many problems as you know how to solve. Enumerate all pages as 1/n, 2/n, …, n/n where n is the total number of pages in your submission. In the bottom of the last page write and sign the academic honesty pledge (the text will be provided with the exam). Scan your work into a single PDF file and name the file as LastNameFirstNamePT (where PT stands for Placement Test). Here are some useful Apps for scanning: CamScanner, Adobe Scan, Scanbot, Microsoft Office Lens, Evernote Scannable, Google Drive, TapScanner, PhotoScan, TurboScan among others. It is important that you practice this procedure before the test and see how much time you need to prepare your submission. Note that the same procedure will be used for all assignments during the course. Late submission will NOT be accepted, especially on any "technical" excuse. Tests without signed the academic honesty pledge will NOT be accepted. If the Canvas page does not function properly during the submission, you may send your work by email (as the last option!). Make sure that your PDF file is not huge. So, set a scanning resolution at a reasonable level sufficient to clearly see your work on a desktop computer screen. Once again, practice your submission before the test. No make-up for the placement exam. Students who do not score high enough will be transferred into regular Calculus 3 sections. Approximately 20-25 students will be selected for the honors section. The results of the placement exam will be posted within 2-3 days after the exam in Canvas and **the course grades and scores page**. You have to provide a web alias (fake) name under which your score would appear. Regarding the academic honesty pledge, since the test is conducted online, you can use plenty of resources during the test. This renders the past tests as useless to practice because nothing was allowed to use in the past tests except one formula sheet. To prepare for the test, use Exercise Sections for Calculus 1 and 2 in a UF calculus textbook (in the previous years, many problems were taken from these

sections). Do problems from the middle of those sections. On the online placement test, you would have to work against the time to do as many problem as you can just like in a math competition. So, searching internet for solutions will be a waste of time. You cannot talk to anybody during the test, or discuss the test problems, or receive any help from any person. This will comprise your honesty pledge which you MUST sign. The goal of the placement exam is to select students who have a good working knowledge of the prerequisites of the course. The course is very intense and difficult to follow at a (necessary) steady pace without good knowledge and technical skills of Calculus 1 and 2.

Enrollment limitations: The course section has a cap of 32 students. The UF enrollment system would not allow any enrollment after the section cap is reached. Since the admission is based on the results of the placement exam, students who cannot enroll into the course due to the aforementioned limitation are advised to enroll into a regular Calculus 3 section and take the placement test. All students who pass the placement test will be transferred to the honors section. There is NO limitation on the number of students who want to take the placement test. Note that Canvas contains only the names of students who are currently enrolled into this section. If you are not currently in this section, then, in order to have an access to the test via Canvas, your name have to be added to the Canvas course shell. Please send me an email asking to add your name (provide a UF ID number so that Canvas recognizes you as a UF student).

Homework

Homework assignments will contain problems from the textbook. Homework is not turned in. A solution manual will also be posted. Doing homework (BEFORE consulting the manual) is essential for understanding the course and attaining a good grade.

Graded assignments

There will be 8 written assignments on Thursdays (time will be decided after the placement test) evenly distributed through out the semester (roughly two per first four chapters of the textbook). Each assignment will be conducted as the placement test. Each assignment is not cumulative and typically covers the material discussed after two previous assignments (the content of one particular chapter of the textbook). The final exam is cumulative with an emphasis on Chapter 5 of the textbook.

Grading and Ranking

Grading: Each exam is graded out of 100 pts. If an assignment contains N regular problem, then each problem is worth 100/N points (typically, N=8, 9, or 10 for regular exams, and N=12, 13, or 14 for the final exam). There is a small partial credit for incomplete solutions, provided the proper concepts have been used in attempt to solve the problem. In your course grade G, the exam average EA counts 80%, final exam FE counts 20%

G = 0.8 EA + 0.2 FE

The grade thresholds

A: G>90; A-: G>85; B+: G>80; B: G>75; B-: G>70; C+: G>65; C: G>60; C-: G>55; D+: G>50; D: G>45;

D-: G>40; E: G<40

Extra credit: One extra non-standard problem will be added to the assignments. If solved correctly, it adds 10-15 pts toward your assignment score, i.e. the perfect score can actually exceed 100 pts. Students who scores above 90 in ALL 8 written assignments during the semester may take either a take-home exam on Chapter 5 (no usual time limit) on the very last day of classes or the regular final exam (as scheduled). The time to turn in the take-home exam will be announced (you would be allowed 2-3 days to do it). The take-home exam score will be counted as the final exam score.

Ranking: The course score G will be used to rank students. The ranking may later be used by the department to evaluate mathematics honors students upon graduation or for admittance to graduate level mathematics courses.

Policies

Make-ups: Make-ups for any missed written assignment only with written medical excuse.

Attendance: No credit for attendance of Zoom Q&A sessions. You may view lectures at any time. However it is strongly recommended that you distribute viewing lectures and doing homework problems evenly through out each week and clarify any questions during the Zoom discussion sessions. A brief description of each lecture will be posted in the homework page along with the lecture schedule.

Special accommodation: Students requesting special accommodation for exams must first register with the Dean of Student Office. The Dean of Student Office will provide documentation to the student who must then provide this documentation to me when requesting accommodation.

Student honor code: Zero tolerance to any kind of cheating on written assignments. If caught cheating, the course grade is an F, no exception.

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