Syllabus: MAC 3473, Calculus III Honors

Description and Goals

Course Text: S.V. Shabanov, Concepts in Calculus III (University Press of Florida, 2012). The latest edition of the textbook (2016) will be provided in a PDF format to download for free.

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 Exam: There will be a placement exam (a new university policy for the Calculus 3 Honors course). The exam covers basic topics of UF Calculus 1 & 2 or their equivalents. It will be scheduled on one of the first three days of the first week of classes. The time and place will be announced in the first class meeting and posted in the course page. No make-up for the placement exam. Students who do not score high enough will be transferred into regular Calculus 3 sections. Approximately 15 students will be selected for the honors section. The results of the placement exam will be posted within a day after the exam. You may use two formula sheets on the placement exam. Calculators and any kind of electronic devices are NOT allowed.

Here is the placement exam from 2015 with solutions. Joker Problems in the placement exam are counted as an extra credit and their maximal score is inversely proportional to the number of students who solved them correctly. 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.

Homework

Homework assignments will contain problems from the textbook. Homework is not turned in. Some of the homework problems will be discussed in class. Quizzes will be made of homework problems. So, doing homework is essential for understanding the course and attaining a good grade.

Written assignments

Quizzes: There will be five quizzes after finishing roughly 3/4 of each of Chapters 1, 2, 3, 4, and 5, respectively. Quiz problems come straight from the homework. Regular class meetings will be used for the quizzes. The date of each quiz will be announced a few days in advance and posted in the homework page. No formula sheet is allowed on the quizzes. Calculators and any kind of electronic devices are also NOT allowed on the quizzes. Solutions to quiz problems will be posted after each quiz.

Exams: There will be four exams given after finishing Chapters 1, 2, 3, and 4, respectively. Exam problems are conceptually the same as those in the homework and Examples given in the corresponding chapter of the book. One formula sheet is allowed on exams (no restriction on the content; it may include formulas, math love mantras, or anything that helps). Calculators and any kind of electronic devices are NOT allowed on the exams. Either regular or special class meetings will be used for exams. Special meetings will be scheduled in evening periods. The exam dates will be announced in class and posted in the homework page. Solutions to exam problems will be posted after each exam.

Final Exam: Final exam is cumulative, but it will contain 5-6 problems from Chapter 5. Two formula sheets are allowed on the Final exam. Calculators and any kind of electronic devices are NOT allowed on the exam. Solutions to final exam problems will be posted after the exam.

Grading and Ranking

Grading: Each exam and each quiz is graded out of 100 pts. If an assignment contains N regular problem, then each problem is worth 100/N points (typically, N=8 or 9 for quizzes and exams, and N=12 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 quiz average QA counts 30%, exam average EA counts 50%, final exam FE counts 20%

G = 0.3 QA + 0.5 EA + 0.2 FE

Here **QA=(Q1+Q2+Q3+Q4+Q5)/5** is your quiz average and **EA=(E1+E2+E3+E4)/4** is your exam average. The grade thresholds

A: G>85; A-: G>80; B+: G>75; B: G>70; B-: G>65; C+: G>60; C: G>55; C-: G>50; D+: G>45; D: G>40; F: G<40

Extra credit: One extra non-standard problem will be added to the exams and quizzes. 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 written assignments during the semester (5 quizzes and 4 exams) may take either a take-home exam on Chapter 5 on the very last day of classes or the regular final exam (as scheduled). The time and place to turn in the take-home exam will be announced. 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.

Class attendance: No credit for class attendance. You may leave or come any time without asking for a permission. However the class attendance is strongly recommended as some of the homework problems as well as sample problems for written assignments will be discussed in class. A brief description of each lecture will be posted in the homework page.

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.