CALCULUS AB SYLLABUS

Professor Gregory Brumfiel, Stanford University

Calculus AB is an introduction to differential and integral calculus. The text will be the Princeton Review AP Calculus AB Exam book, 2017 Edition. There are many practice problem sets and practice exams in the book. There are also sections describing the basic ideas of calculus, which will be emphasized in class meetings. There are four Units.

- Unit 1: Differential Calculus Essentials
- Unit 2: Differential Calculus Applications
- Unit 3: Integral Calculus Essentials
- Unit 4: Integral Calculus Applications

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
			UNIT 1 §§3, 4 Limits and Continuity	UNIT 1 §5 Derivatives and Slopes
UNIT 1 §6 Derivative Rules	UNIT 1 §6 Derivative Rules	UNIT 1 §7 Implicit Derivatives	UNIT 2 §8 Rolle's Theorem, Mean Value Theorem	UNIT 2 §9 Maxima and Minima
UNIT 2 §9 Curve Sketching	UNIT 2 §10 Motion, Related Rates	UNITS 1 and 2 Review and Quiz	UNIT 2 §11 Exponential and Log Functions	UNIT 2 §12 Inverse Functions, Differentials, L'Hopital's Rule
UNIT 3 §13 Antiderivatives	UNIT 3 §14 Definite Integrals	UNIT 3 §14 Fundamental Theorem	UNIT 3 §15 Exponentials and Logs	UNIT 4 §16 Areas
UNIT 4 §17 Volumes	UNIT 4 §18 Differential Equations	UNITS 2, 3 and 4 Review and Exam		

I am Gregory Brumfiel, a Professor of Mathematics at Stanford University in California. I have been invited to teach two Calculus classes in the summer of 2017 for the Special A program in Beijing. These classes will be Calculus AB and Calculus BC, patterned after the American high school calculus programs with these same names. Calculus AB is considered equivalent to one semester of American college calculus. Calculus BC is considered equivalent to one year of American college calculus. In practice, almost no students begin with the Calculus BC course. First students take the AB course, then they take the BC course, which includes some review of AB topics. I would advise students considering calculus courses with the Special A summer program to take the AB course if they have had relatively little previous exposure to calculus. Students with significant previous exposure to calculus could take the BC course.

Here are some other considerations. The summer courses are quite intensive, ten hours of class meetings each week for four weeks. Keeping up this pace will require concentrated effort from students. The courses will be taught in English, which may add an additional ingredient for students to deal with. Calculus is a pretty sophisticated subject, and even students with some previous exposure may find they learn it much better seeing a new presentation. In other words, some repetition is not a bad idea when learning subjects like calculus.

The Director of the Special A program has told me that the Princeton Review books, Calculus AB and Calculus BC have been used previously in the program. I plan to also use these books. Let me say a few words about these texts. They are not calculus texts in the usual sense, but rather they are designed to prepare American students for the Mathematics Advanced Placement Exams in Calculus. Students who score well on these standardized exams usually get college credit for some calculus at the beginning of their American college careers. They also are able to begin college study with more advanced mathematics classes. As books preparing students for exams, the Princeton Review texts have many practice tests, many exercises, and detailed discussions of how to most efficiently solve calculus problems of various types. But each book also has over 300 pages of descriptive text material about the ideas and theory of calculus. I am most interested in teaching these ideas to students. At the same time, there is no point in learning calculus as an abstract subject, without also learning how the ideas allow students to solve problems easily. The point is, it is important to emphasize understanding, rather than just mechanical procedures for getting answers. For students who understand the ideas, the procedures for solving problems make a lot more sense, and they are easier to remember and carry out correctly.

I am very much looking forward to working with calculus students in the Beijing 2017 Special A summer program. In addition to the classroom course sessions, I hope to work with individual students and small groups of students outside the class hours.