

Course Syllabus for Calculus I (vv115)

1 Course Description

The sequence vv115-116-215-216 provides students at UM-SJTU JI with an introduction to the concepts and methods of calculus. Vv115 is the first course in this sequence and covers introductory topics in the calculus of functions of one variable including: functions and graphs, limits and continuity, differentiation and its applications, and an introduction to integration. The emphasis of the course be to equip students with the skills and understanding to solve problems involving the calculus of functions of variable that arise in engineering. Students will also develop their mathematical communication and interrogation skills.

2 Course Information

Lecturer: Zach McKenzie

E-mail: zachiri.mckenzie@sjtu.edu.cn

Room: 409

Lectures: Tuesdays 8:00am-9:40am in E3-105, and Mondays of every odd week and Thursdays 8:00am-9:40am in E3-101

Office Hours: Tuesdays 1:00pm-3:00pm

Teaching Assistant: See CANVAS for the contact details of the TA

Recitation Classes: The teaching assistant will lead weekly recitation classes beginning in the second week. Students are expected to attend this recitation class.

3 Grading Policy

Assignments worth 25%: Assignments will be given in the form of problem sets, and may require extra reading and the use of mathematical software. A penalty of 20% per week late will apply to late assignments, and assignments that are more than 2 weeks late will not be accepted.

Exams worth 75%: There will be two midterm exams worth 25% each and a final exam worth 25%.

4 Textbook

Textbook: "Calculus", by Hughes-Hallett, Gleason, et al, 5th Edition.

5 Syllabus

Weeks 1 and 2: Functions of one variable and graphs: the Least Upper Bound Principle and the real numbers, functions, exponential and logarithmic functions, trigonometric functions, inverse functions, polynomial and rational functions

Week 3: Limits and continuity: definitions of limits, the limit and $\delta\epsilon$ -definition of continuity, the Intermediate Value Theorem

Week 4: National Holiday

Week 5: The derivative: conceptual introduction to the derivative, the definition of the derivative

Weeks 6 and 7: Techniques of differentiation: the product and quotient rules, the chain rule, the power rule, the derivative of exponential functions, the derivative of trigonometric functions, the derivative of inverse functions, implicit differentiation

Week 9: Rolle's Theorem and the Mean Value Theorem: the Extreme Value Theorem, Rolle's Theorem, the Mean Value Theorem, applications of Rolle's Theorem and the Mean Value Theorem

Weeks 9, 10 and 11: Applications of the derivative: critical points and inflection points, local and global minima and maxima, special functions, optimisation problems, applications of the chain rule, l'Hopital's rules

Weeks 12 and 13: Introduction to integration: conceptual and theoretical introduction to the definite integral, the Fundamental Theorem of Calculus