

Math 121 - Calculus & Analytic Geometry I

Spring 2004 Course Syllabus

James Jones, Professor of Mathematics
Mathematics & Sciences Division
Richland Community College

Course Meeting Information

Section 01 meets from 5:00 pm to 7:15 pm on Mon and Wed in room S137.

Instructor Information

James Jones, Professor of Mathematics.

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Office Hours

These are the times I'm scheduled to be in my office. If these times are not convenient for you, please see me to make an appointment for some other time.

Mon: 1:00 pm - 1:50 pm, 4:00 pm - 4:50 pm

Tue: 12:00 pm - 12:25 pm

Wed: 4:00 pm - 4:50 pm

Thu: 12:00 pm - 12:25 pm

Fri: 1:00 pm - 1:50 pm

Texts

Calculus: A New Horizon, 7th edition. Howard Anton. Copyright 2002, John Wiley & Sons, Inc. (Required)

Student Resource Manual. Copyright 2002, John Wiley & Sons, Inc. (Optional)

Student Audience

Transfer students. Students pursuing degrees in engineering, mathematics, computer science, natural sciences, and life sciences.

Prerequisite

Successful completion (C or better grade) of Math 116, College Algebra, and Math 117, Trigonometry, or satisfactory score on the Mathematics placement exam.

Course Description

MATH 121 - Calculus & Analytic Geometry I

Hours: 4 lecture - 0 lab - 4 credit

Mathematics 121, Calculus and Analytic Geometry I, includes instruction in Calculus topics common to the standard college first semester Calculus course. It begins with a review of algebra; then the idea of limits and continuity will be introduced. With the knowledge of limits and continuity the student develops the concept of the derivative and its applications. At the end, the student studies the antiderivative of elementary functions and their applications.

Applicable toward graduation where program structure permits.

- Certificate or degree: All certificates and all degrees.
- Group requirement: Mathematics
- Area of Concentration: Mathematics.

Illinois Articulation Initiative (IAI)

The mathematics component of general education focuses on quantitative reasoning to provide a base for developing a quantitatively literate college graduate. Every college graduate should be able to apply simple mathematical methods to the solution of real-world problems. A quantitatively literate college graduate should be able to:

- interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them;
- represent mathematical information symbolically, visually, numerically, and verbally;
- use arithmetic, algebraic, geometric, and statistical methods to solve problems;
- estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results; and
- recognize the limitations of mathematical and statistical models.

Courses accepted in fulfilling the general education mathematics requirement emphasize the development of the student's capability to do mathematical reasoning and problem solving in settings the college graduate may encounter in the future. General education mathematics courses should not lead simply to an appreciation of the place of mathematics in society, nor should they be merely mechanical or computational in character.

To accomplish this purpose, students should have at least one course at the lower-division level that emphasizes the foundations of quantitative literacy and, preferably, a second course that solidifies and deepens this foundation to enable the student to internalize these habits of thought.

Math 121, Calculus & Analytic Geometry I, satisfies the Illinois Articulation Initiative Definition of a General Education Mathematics Course. It corresponds to MI 900, College-level Calculus.

For more information on the Illinois Articulation Initiative, visit their website at

<http://www.itransfer.org/>

General Course Objectives

While learning calculus is certainly one of the goals of this course, it is not the only objective.

Upon completion of this course, the student should be able to ...

- demonstrate comprehension and understanding in the topics of the course through symbolic, numeric, and graphic methods
- demonstrate the use of proper mathematical notation
- use technology when appropriate and know the limitations of technology
- work with others towards the completion of a common goal
- use deductive reasoning and critical thinking to solve problems

Specific Course Objectives

Upon completion of this course, the student should be able to ...

- find the limits of expressions involving algebraic and trigonometric functions

- determine where functions are continuous and classify discontinuities as removable or non-removable
- find the derivative of a function using the limit definition
- apply the basic rules of differentiation to find the derivatives of algebraic and trigonometric functions
- find higher order derivatives
- use implicit differentiation
- analyze the graph of a function using the first and second derivative
- use the derivative to solve applied problems involving maximums and minimums
- find the antiderivative of algebraic and trigonometric functions
- understand the relationship between Riemann sums and definite integrals
- apply the fundamental theorem of calculus to evaluate definite integrals
- find the area under a curve and between two curves
- find volumes of rotation, lengths of planar curves, and surface areas of revolution
- work application problems from physics including work, force, and pressure

Type of Instruction

Discussion, problem solving, student questions, student participation, oral presentations, and lecture. Students are expected to read the material before coming to class and are strongly encouraged to come to class with a list of questions and to ask these questions.

Method of Evaluation

Could include any of the following: problem solving exams, objective exams, essays, research papers, oral presentations, group projects, quizzes, homework.

Grading Policy

Letter grades will be assigned to final adjusted scores as follows:

- A: 90 - 100%
- B: 80 - 89%
- C: 70 - 79%
- D: 60 - 69%
- F: below 60%

Consideration may be given to such qualities as attendance, class participation, attentiveness, attitude in class, and cooperation to produce the maximum learning situation for everyone.

The instructor will give you a grade sheet so that you can record your scores and keep track of your progress in the course. If you are concerned about your grades, see the instructor.

Assignments are due at the beginning of the class period on the date they are due. The instructor may be gracious and allow you to turn them in later that day without counting them late, but do not count on his graciousness. Late assignments lose 10% of their value per class period. The instructor reserves the right to apply this rule to missed exams as well as regular assignments.

Attendance Policy

Regular attendance is essential for satisfactory completion of this course. If you have excessive absences, you cannot develop to your fullest potential in the course. Students who, because of excessive absences, cannot complete the course successfully, will be administratively dropped

from the class at midterm. If a student stops attending after midterm, it is the student's responsibility to withdraw to avoid an "F". The instructor has the ability, but not responsibility, to drop students who are not regularly attending at any time during the semester. The safest way to make sure you're not dropped for non-attendance is to continue to attend classes.

The student is responsible for all assignments, changes in assignments, or other verbal information given in the class, whether in attendance or not.

If a student must miss class, a call to the instructor (RCC's phone system has an answering system) should be made or an email message sent. When a test is going to be missed, the student should contact the instructor ahead of time if at all possible. Under certain circumstances, arrangements can be made to take the test before the scheduled time. If circumstances arise where arrangements cannot be made ahead of time, the instructor should be notified and a brief explanation of why given by either voice or email. This notification must occur before the next class period begins. At the instructor's discretion, the student may receive a zero, make up the exam with (or without) penalty, or substitute the final exam score for the missed exam.

Calculators

A TI-89 or TI-92 calculator is highly recommended for this course. There are computers in the classroom with Derive on them, and these may be used by students who don't have the TI-92 calculator. Calculators may be used to do homework. Calculators may be used on exams and/or quizzes in class unless otherwise announced.

Additional Supplies

The student should have a pencil, red pen, ruler, graph paper, stapler, and paper punch. The student is expected to bring calculators and supplies as needed to class. The calculator should be brought daily. There will be a paper punch and stapler in the classroom.

Homework

[Homework](#) out of the book is not collected for a grade. However, success in the class is correlated to the amount of homework done. Do not expect to master the subject without doing homework. Students have the option of doing the homework and replacing their lowest test score with the homework.

Additional Help

The student is encouraged to seek additional help when the material is not comprehended. Mathematics is a cumulative subject; therefore, getting behind is a very difficult situation for the student. There are several places where you can seek additional help in your classes.

Instructor

I try to make myself as available to the students as I can. My office hours are listed at the beginning of this syllabus, but those are just the times I'm scheduled to be in my office. Grab me and ask me questions if you see me in the hallway. Ask questions before or after class. If I'm in my office and it's not my scheduled office hours, go ahead and stop in.

The instructor should be considered the authoritative source for material related to this class. If a tutor or other student says something that disagrees with the instructor, believe the instructor.

Study Groups

Probably the best thing you can do for outside help is to form a study group with other students in your class. Work with those students and hold them accountable. You will understand things much better if you explain it to someone else and study groups will also keep you focused, involved, and current in the course.

Student Learning Center

The Student Learning Center is located in rooms S116, S117, and S118. There is mathematics tutoring available in room S116. The Student Learning Center and the tutoring is a service that Richland Community College offers you free of charge.

Quality tutors for the upper level mathematics are difficult to find. Please consider forming a study group among your classmates.

Learning Accommodation Services

There are accommodations available for students who need extended time on tests, note takers, readers, adaptive computer equipment, braille, enlarged print, accessible seating, sign language interpreters, books on tape, taped classroom lectures, writers, or tutoring. If you need one of these services, then you should see Learning Accommodation Services in room C136. If you request an accommodation, you will be required to provide documentation that you need that accommodation.

Some of you will need additional time on tests. There is no need to go to learning accommodation services to request that. If you need additional time, just let me know and I will probably allow you to continue working past the allotted time. You may need to move to another room as there may be another class coming into your room. If you're unable to finish the test by staying late, it may be possible to start the test earlier to gain additional time.

Academic Dishonesty

Each student is expected to be honest in his/her class work or in the submission of information to the College. Richland regards dishonesty in classroom and laboratories, on assignments and examinations, and the submission of false and misleading information to the College as a serious offense.

A student who cheats, plagiarizes, or furnishes false, misleading information to the College is subject to disciplinary action up to and including failure of a class or suspension/expulsion from the College.

Non-Discrimination Policy

Richland Community College policy prohibits discrimination on the basis of race, color, religion, sex, marital or parental status, national origin or ancestry, age, mental or physical disability (except where it is a bonafide occupational qualification), sexual orientation, military status, status as a disabled or Vietnam-era veteran.

Topical Outline

Hours	Topic
10	Functions <ul style="list-style-type: none">• Analysis of graphs• Properties of functions• Graphing functions on calculators and computers• Transformations of functions• Lines• Extensive review of trigonometry• Families of functions
10	Limits and Continuity <ul style="list-style-type: none">• An intuitive approach to limits• Computing limits• Infinite limits• Rigorous definition of limit• Continuity• Limits and continuity of trigonometric functions
12	Derivatives <ul style="list-style-type: none">• Slopes and rate of change• The limit definition of derivative• Techniques of differentiation• Derivatives of trigonometric functions• The chain rule• Implicit differentiation• Related rates• Differentials and local linear approximations
13	Applications of Differentiation <ul style="list-style-type: none">• Intervals where increasing, decreasing, constant, concave up, concave down• Relative extrema and points of inflection• First and second derivative test• Rectilinear motion• Absolute extrema• Applied maximization and minimization problems• Newton's Method• Rolle's Theorem and the Mean Value Theorem
13	Integration <ul style="list-style-type: none">• Overview of the area problem• Indefinite integrals, integral curves• Integration by substitution• Sigma notation, Riemann sums• The definite integral• Fundamental theorem of Calculus• Rectilinear motion; average value• Definite integrals by substitution

Hours	Topic
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	Applications of Definite Integrals
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- The area between two curves
- Volumes of rotation by slicing, disks, washers, and cylindrical shells
- Length of a plane curve
- Surface area of revolution
- Work
- Fluid pressure and force