

Math 221 – Calculus & Analytic Geometry 3

Fall 2019 Course Syllabus

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

Course Meeting Information

Section 01 meets from 10:30 to 11:40 pm on Monday, Wednesday, and Friday in room S137. The class meets from Friday, August 16th to Monday, December 9th.

The comprehensive final exam will be Monday, December 9th from 10:00 to 11:50 am. An alternative time to complete the final is Wednesday, December 11th from 2:00 to 3:50 pm.

This is a face-to-face course, but the Canvas learning management system will be used. There is an online student orientation to Canvas and the College that must be completed prior to obtaining access to your courses in Canvas.

Submitting assignments in Canvas or WebAssign does not count as attending class. The WebAssign (<https://www.webassign.net>) class key for this course is **richland 5237 0118**

Instructor Information

James Jones, Professor of Mathematics.

Email: james@richland.edu

Web: <https://people.richland.edu/james/>

Office: S224; Phone: 217-875-7211, ext 6490

WebAssign: <https://www.webassign.net>

Canvas: <https://richland.instructure.com>

Office Hours

I spend most of my office hours in the classroom, room S137. This allows me to help students with their assignments, homework, projects, exams, and questions.

- Monday: 10:10–10:30 am, 1:00–1:15 pm, 2:40–3:00 pm, 4:10–4:40 pm
- Wednesday: 10:10–10:30 am, 1:00–1:15 pm, 2:40–3:00 pm, 4:10–4:40 pm
- Friday: 10:10–10:30 am, 1:00–1:15 pm, 2:40–3:00 pm, 4:10–4:40 pm

Text

There is a textbook and an electronic homework package required for this course. The electronic package also includes an electronic version of the textbook and you do not have to buy a printed textbook if you want to go completely electronic.

- *Essential Calculus: Early Transcendentals, 2nd edition*. James Stewart. Copyright 2013, Brooks/Cole Cengage Learning. ISBN-13 978-1-133-11228-0 (Required textbook, but printed version is optional)

- *Enhanced WebAssign Homework and eBook LOE Instant Access for Multi Term Math and Science, 1st Edition*. ISBN13: 978-1-285-18421-0 (Required, but can also be purchased within WebAssign)

The two items above can be bundled together for cost savings.

- *ePack: Essential Calculus: Early Transcendentals, 2nd + Enhanced WebAssign Homework and eBook LOE Instant Access for Multi Term Math and Science*. ISBN-13: 978-1-285-94067-0 (Required)

Cengage Unlimited (new Fall 2018)

The publisher for your textbook is Cengage. They have unveiled a new program in August 2018 called *Cengage Unlimited*. It is a subscription service that allows access to all Cengage ebooks and digital learning products (not just the ones in this course). This includes the access to WebAssign, which is required for this course.

The cost is \$119.99 for one term (4 months) or \$179.99 for one year (12 months). If you want a printed version of the book, you can rent it for \$7.99 per semester with free shipping.

Students should not purchase both course materials and a Cengage Unlimited subscription, only one is required.

More information is available online at <https://www.cengage.com/unlimited>

Student Audience

Transfer students. Students pursuing degrees in engineering, mathematics, life sciences.

Prerequisite

Successful completion (C or better grade) of Math 122, Calculus and Analytic Geometry II.

Course Description

MATH 221 - Calculus and Analytic Geometry 3

Hours: 4 lecture - 0 lab - 4 credit

MATH 221 is a standard multivariable calculus course intended for students going into areas of science, technology, engineering, or mathematics. Topics covered include three-dimensional space, vectors and their operations, vector-valued functions, arc length, and curvature; partial derivatives with applications, tangent planes, directional derivatives, gradients, and optimization problems; multiple integrals with applications in rectangular, polar, cylindrical, and spherical coordinates systems. The course concludes with vector calculus, line integrals, parametric surfaces, and their applications.

Applicable toward graduation where program structure permits.

- Certificate or degree: All certificates and all degrees.
- Group requirement: Mathematics
- Area of Concentration: Not applicable.

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 221, Calculus & Analytic Geometry 3, satisfies the Illinois Articulation Initiative Definition of a General Education Mathematics Course. It corresponds to M1900-3, College-level Calculus III. This course description also matches Math Majors course description for MTH 901: Calculus III.

The IAI description for Calculus involves all three semesters since some schools cover the sequence in a different order. The portion of the Calculus sequence that is covered in Richland's Calculus 3 is *highlighted in red italics*.

M1 900-3: College-level Calculus III

MTH 903: Calculus III

Topics include (but are not limited to) the following: limits and continuity; definition of derivative: rate of change, slope; derivatives of polynomial and rational functions; the chain rule; implicit differentials; approximation by differentials; higher order derivatives; Rolle's

Theorem: mean value theorem; applications of the derivative; anti-derivative; the definite integral; the fundamental theorem of calculus; area, volume, other applications of the integral; the calculus of the trigonometric functions; logarithmic and exponential functions; techniques of integration, including numerical methods; indeterminate forms: L'Hôpital's rule; improper integrals; sequences and series, convergence tests, Taylor series; *functions of more than one variable, partial derivatives; the differential, directional derivatives, gradients; double and triple integrals: evaluation and applications*. Prerequisite for Calculus III: Calculus II or equivalent of C or better.

When three courses are required to convey the necessary skills in calculus to mathematics majors, it is highly advised that students complete the entire sequence at a single institution. Course content may vary widely among institutions depending on the credits assigned to each course, and completing the sequence at a single institution is the best way to assure that neither credit nor content is lost in transfer.

For more information on the Illinois Articulation Initiative, visit their website at <http://www.itransfer.org/>

Topical Outline

A weekly calendar listing the specific material covered each week is provided at the end of this syllabus. This section is provided as a broad overview of the major topics covered.

This course does not run on calendar weeks and any attempt to coerce the calendar into a weekly schedule necessarily introduces some approximation. For example, an exam may be in a different week than the weekly heading suggests or a chapter may begin midweek.

The official calendar that the students receive is a one page, 16 week, daily calendar. This calendar lists the section from the textbook being covered each day and the dates that major assessments are due. Due dates will also be listed in the Canvas learning management system.

- Vectors and the Geometry of Space – 4 weeks
- Partial Derivatives – 3 weeks
- Multiple Integrals – 4 weeks
- Vector Calculus – 4 weeks

General Course Objectives

A topical outline of the content covered in the course follows this section.

Specific Course Objectives

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

- convert between rectangular, spherical, and cylindrical coordinate systems

- find dot products, cross products, and projections using vectors
- form and work with parametric equations of lines
- distinguish the forms of the quadric surfaces
- differentiate and integrate vector valued functions
- find the arc length of a vector valued function
- find the unit tangent, normal, and binormal vectors
- determine the limits of a multi-variable function
- find partial derivatives
- use the chain rule for derivatives with multi-variable functions
- determine directional derivatives and apply the gradient
- find the maximum and minimum of a multi-variable function, identify saddle values
- use the method of Lagrange multipliers to determine the extrema of a multi-variable function
- set up the regions and integrate double integrals in rectangular and polar coordinates
- set up and evaluate triple integrals in rectangular, cylindrical, and spherical coordinates
- use the Jacobian to change variables to ease integration
- find the divergence and curl
- evaluate line integrals
- determine whether a vector field is conservative and use Green's theorem
- find surface integrals
- apply Stoke's theorem

General 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.^{1, 2, 4}
- demonstrate the use of proper mathematical notation.^{1, 2}
- use technology when appropriate and know the limitations of technology.^{1, 2, 3, 4}
- work with others towards the completion of a common goal.^{1, 2, 3, 4}
- use deductive reasoning and critical thinking to solve problems.⁴
- apply common sense to mathematical problems.⁴
- effectively communicate the student's understanding of the subject.^{1, 2}

The numbered superscripts refer to the Richland Cross-Disciplinary Outcomes addressed by that objective.

Richland Cross-Disciplinary Outcomes

Richland Community College has established some outcomes for degree-seeking students. These are not necessarily completed within a single course, but should be demonstrated and assessed at some point before the student graduates. Richland may utilize anonymous student work samples for outcomes assessment and continuous improvement of courses and programs.

Richland Community College's cross-disciplinary outcomes are:

1. The degree-seeking student will communicate effectively in writing.
2. The degree-seeking student will orally communicate effectively.
3. The degree-seeking student will access, evaluate, and appropriately use information in research and applied contexts.
4. The degree-seeking student will think critically and creatively.

Program Outcomes

In addition to the cross-disciplinary outcomes, the mathematics program at Richland Community College has established some discipline-specific outcomes and goals.

1. **Mathematical Reasoning:** Students will apply mathematical reasoning to solve story problems. This goal influences the course, but is not measured directly.
2. **Preparatory Skills:** Students will demonstrate mathematical competencies needed for success in other courses. This goal influences the course, but is not measured directly.

Type of Instruction

Instruction will occur through discussion, problem solving, student questions, student participation, oral presentations, quizzing, and lecture. Students are expected to read the material and attempt to answer the homework 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

Evaluation could include any of the following: problem solving exams, objective exams, essays, research papers, oral presentations, individual and group projects, quizzes, classroom activities, engagement, and homework.

Category	% Grade	Drops	Late work accepted / Extra credit?
Exams	65%	0	See instructor ahead of time
Homework	15%	3	1 week / 10% bonus if 48 hours early
Technology Projects	10%	1	1 week / 5% bonus possible
Activities & Quizzes	10%	6	No

65% of the grade is by proctored exam: 45% of this will come from regular chapter exams and

20% of it comes from a comprehensive final exam.

Extra credit is constrained by the weights of the assignment categories. Homework can receive up to 10% extra credit, but since homework is only worth 15% of the grade, the overall effect on the grade is limited to 1.5%. The potential bonus for exceptional work on the technology projects is 5%, but the assignment category is worth 10% of the grade, so the overall effect is limited to 0.5%. Combined, a student may receive up to 2% extra credit in the course.

There are approximately 30 sections of homework and each section has a reading quiz associated with it. The three homework assignments and six reading quizzes and prelecture assignments dropped account are about 10% of the assignments in each category.

WebAssign Homework – 15% of grade

Practice is essential for mastery of the material and homework is the primary means of practice.

You are expected to have read the section and attempted the homework before the material is covered in class. Class time will be used to establish deeper levels of understanding.

The three (3) lowest homework grades for each student will be dropped from the gradebook.

WebAssign is a software package that is designed to be a homework and testing framework. It also provides access to an electronic version of the textbook.

For each section in the textbook, there is an accompanying homework assignment in WebAssign. These assignments cover all of the topics from the section and should take about 90 minutes to complete.

Here is a summary of the homework settings in effect for most of the questions. A few questions may use different settings.

- You get six attempts to answer most questions. This will not be the case when there is no randomization involved in the questions.
- True-false questions get a single attempt.
- If the problem uses randomized values, then you will be shown the correct answer after 3 attempts and be given a similar problem with different values.
- You may submit individual questions for grading rather than waiting to complete the entire assignment. You may also save your answers without using a submission attempt.
- The best score on individual parts of a question is used rather than on the entire question.
- Each question is typically worth 1 point, regardless of the number of parts involved.
- Homework becomes available one week before we are scheduled to cover the material.
- Homework is due fifteen minutes before the start of the class period following the last scheduled day of coverage. For example, if we start a section on Monday and finish it on Wednesday, the homework is due before the start of Friday's class.

- Homework completed more than 48 hours before it is due is awarded a 10% bonus. This is intended to be a bonus for completing the homework before we cover the material in class. For sections with more than one day of coverage, you will be able to attend the first day of coverage and still get the bonus. For example, if we start a section on Monday and finish it on Wednesday, the homework isn't due until Friday, which means that you get the bonus as long as you have it done before the start of Wednesday's class.
- In order to complete homework after the due date, you must request an extension, which automatically gives you up to an additional 7 days to complete the homework. Regardless of when you request the extension, it must be completed within 7 days of the original due date. Homework completed within the last 48 hours available receives an approximately 9.1% penalty.
- Extensions do not give you extra attempts to complete the questions, they just give you more time to complete the attempts you have left. If you have already used your six attempts, requesting an extension won't have any benefit.

When was the homework completed?	Adjustment	Percentage
More than 2 days early	+ 10%	110%
2 days early to 5 days late	0%	100%
More than 5 days late	- 9.1%	90.9%

Although homework is done with WebAssign, the official gradebook is kept inside Canvas. The transfer process is manual and the grade in Canvas may not reflect recent homework grades from WebAssign.

Activities & Quizzes – 10% of grade

Reading quizzes, prelecture assignments, and activities cannot be made up if missed. However, the six (6) lowest grades will be dropped.

WebAssign Prelecture

WebAssign contains prelecture assessments for each textbook section. According to WebAssign, these introductory exercises are focused mainly on just-in-time precalculus review and other prerequisite skills. There are 4–10 questions per section and should take approximately 30 minutes to complete.

These prelecture assignments will open to the student one week before and close ten minutes before the class where the material is introduced.

Although prelecture assignments are completed within WebAssign, the official gradebook is kept inside Canvas. The transfer process is manual and the grade in Canvas may not reflect recent prelecture grades from WebAssign.

Reading Quizzes

The WebAssign Prelecture assignments may help you be ready to tackle the lesson, but you should also have read the section and taken notes before coming to class. You do not have to understand all of it, but there should be a basic level of familiarity before class because a large portion of class time will be spent working on conceptual understanding, not basic skills.

The reading quizzes are short quizzes to assess your basic understanding. They are completed inside Canvas before we work on the material in class. The quizzes normally consist of a few and you have 10 minutes to complete the quiz.

The quizzes are due five minutes before the start of class and will be unavailable after this time. They become available after the previous class meeting has finished, so you will have almost two days in which to attempt each quiz and longer on the weekends and holidays.

The reading quizzes are designed to be completed after you have read and taken notes on a section. You only get one attempt at each reading quiz, so be sure to study the material ahead of time. If you go into them without having looked at the material, you may find it difficult to complete within the 10 minutes allowed.

Your score will be available as soon as you complete the quiz. There have been too many problems with one student answering the questions and sharing the answers with others, so the correct answers will not be shown until after the quiz-taking period is over.

Remember that all grades are subject to audit and correction. If there are mistakes in the answers, they will be corrected and the quiz will be rescored. Students who put down the answer the computer gives, later to find out that it was an incorrect answer, will end up losing the points. Do the work yourself, don't just copy other people's answers.

Activities

Much of the learning in the classroom is done using collaborative learning and group projects. Some sections will have an activity sheet designed to help you learn and more deeply understand the material than the traditional homework problems. At times, everyone will go to the board to work a problem in small groups so that I can see how you're doing.

Some of these activities are instructional in nature and not graded directly. However, the instructor will be observing the group dynamics during these activities to see who participates, who leads, who contributes, and who just lets the others do the work.

Other activities, loosely defined to be something we do in class, may be for a grade. This also include any in-class quizzes.

Activities take place in class and may not be made up if you are absent during the activity or quiz.

Technology Projects – 10% of grade

Sometimes the classroom activity is more self-directed and intended to produce a tangible result that will be graded based on content and correctness. They will often involve the use of technology to go into a deeper exploration of the concepts.

These projects are normally worked on during class in small groups, but you may need to finish them outside of class.

In many cases, material on the exam may relate to concepts learned on these projects. For this reason, each student should understand all of the problems on the projects. The temptation in group projects like this is to divide the project and assign each member a portion to complete. While this may seem like a good idea, it will hurt you when it comes to the exam as each student needs to know all of the material contained in the projects.

Your work will be graded holistically based on the quality and quantity of the work and explanations provided.

Rating	Score	Description
Awesome	105%	Exceptional job that really impresses the teacher
Good	90%	Beyond what was required
Okay	75%	Satisfactory completion of requirements
Fair	60%	Almost there, but needs some development
Poor	45%	Minimal attempt at completing assignment
None	0%	Did not participate or submission nowhere close to assignment

The projects may be turned up to one week late, with a potential reduction in points. One project grade will be dropped from your grade. No late work will be accepted after the final.

Exams – 65% of grade

WebAssign homework is designed to measure your mastery of skills. In contrast, exams will measure a combination of skills and understanding, with more emphasis on the understanding.

The in-class exams in this course generally have limited numbers of basic skills questions on them. That is, there are limited amounts of straight-forward "differentiate this" or "integrate this" type problems. That has been pushed off onto the WebAssign portion of your grade.

What you will find on the in-class exams are a few problems that get at how deeply you *understand* the concepts rather than a lot of problems that assess how well you have memorized how to work a particular type of question. The questions will often be similar to ones encountered in the group activities or on the technology projects, or they might be items you've never seen before but you should be able to figure out with the information you have seen.

No exams will be dropped from your grade.

Missed Exams

Occasionally situations arise on an exam day where the student cannot make an exam. Other times students decide that they are not prepared for an exam and they would do better with additional time to study, despite the anecdotal evidence not supporting this. The instructor doesn't want students to feel that they need to fake illness to get out of an exam, so the following option may be applied one time during the course on a regular exam, no questions asked.

If you are unable to complete the exam with the rest of the class on the day it is scheduled, then the instructor will place your exam in the testing center and you will have until the start of the 2nd class period after the scheduled exam to complete the test. That is, you are allowed one class meeting after the scheduled date, but you must have it completed before the second class meeting after the scheduled date begins. Failure to complete the exam before the beginning of the second class period will result in a zero for the grade

That paragraph is a little confusing, so here are some examples. All assume that the class meets Monday, Wednesday, and Friday:

- A test is scheduled for Friday. The next class meeting is on Monday and you have until the start of Wednesday's class to complete the exam.
- A test is scheduled for Monday, but there the college is closed on Wednesday. Friday's class would be the first one after the exam and so you must have it completed by the following Monday's class begins.

This two-class limit is to keep other students from suffering anxiety about getting their exam back in a timely fashion. It is also to keep you from falling further behind in the class.

Note that testing center is open limited hours: 8:00 am to 7:00 pm on Monday and Thursday, and 8:00 am to 5:00 pm on Tuesday, Wednesday, and Friday. The testing center is not open on Sundays, holidays, days when there are no classes, and most Saturdays. The times listed here are subject to change and not binding on the testing center, so you should check with the testing center to confirm their hours.

You will need to bring a photo identification with you when you come to take the exam.

The first exam that you miss and complete as described in the testing center will not experience a reduction in grade. If you miss additional scheduled exams, then the above procedure will be applied except that there will be a 10% penalty applied to those exam scores.

Absolutely no late work will be accepted after the final exam, so the last in-class exam must be taken as scheduled with the rest of the class.

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%

Final scores will be rounded to the nearest integer, so an 89.5% will be considered an "A".

All grading are subject to audit and revision if mistakes are found.

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 gradebook for the course will be kept inside Canvas. When you look at your grades in Canvas, there may be a + or - after the letter grade (example, B+ or C-). The plus or minus after the letter grade is informational and intended to be used as an encouragement or a warning that you might be able to move up or that you are in danger of slipping down. However, the final grades in the course will not contain a + or a -, just the letter grade, and an 80.1% is as much of a B as an 88.7% is.

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 Work

This is a summary of information found in other parts of the syllabus. For more information, look in those sections.

Absolutely no late work will be accepted after the final.

- WebAssign homework is available one week before we start a section and is due fifteen (15) minutes before the next class period after we are scheduled to finish a section. If you complete the homework more than 48 hours before it is due, you get a 10% bonus. You must ask WebAssign for an extension of 7 days to continue working on it. Regardless of when the request for an extension is made, the extension must be completed within 7 days of the original due date. Make sure you have time to work on the homework before requesting an extension. The three lowest homework scores will be dropped.
- Activities and Quizzes include classroom activities, classroom quizzes, WebAssign prelecture assignments, and Canvas reading quizzes. They cannot be turned in late, but the six lowest assignment scores will be dropped.
 - WebAssign prelecture assignments are due ten minutes before class begins on the first day we are scheduled to cover a section. They become available one week before they

are due.

- Reading quizzes are due five minutes before class begins on the first day we are covering that section. They become available once the previous class meeting has finished.
- Activities and quizzes are conducted during class and cannot be made up if you miss the activity.
- Technology Projects are normally due the day we work on them in class. They will be accepted up to one week late, but lateness may factor into your grade. They are graded holistically and lateness may factor into the overall grade. One project grade will be dropped.
- Exams will be placed in the testing center for anyone missing the scheduled day of the exam. You have until the start of the second class period after the scheduled exam to complete the test. If you complete it before the start of the second class period following the exam, then there is no penalty for being late. If you fail to complete the exam before the start of the second class period following the exam, then you will get a zero (0) for the exam. If more than one exam is not taken as scheduled, then a 10% penalty will apply to the scores on those late exams. No exam scores will be dropped.
- Absolutely no late work will be accepted after the final.

Attendance / Engagement Policy

Attendance vs Participation

This is a face-to-face class and attendance is important. We use Canvas, but it is to facilitate the classroom management, not to replace the material covered or instructions given. Working on homework in WebAssign or turning in the assignments in Canvas does not count as attendance.

Attendance also means more than just being physically present in the room. It involves components of attendance, participation, engagement with others, paying attention, taking notes, and completion of assignments. It means not being distracted by your cell phone, the computer in front of you, or working on material for another course. It even means not working on quizzes or discussions for this course while the class is doing something else.

Attendance is recorded every class period as the percent of the class that where you were present and engaged. If you are physically there but not engaging in the class as described above, this may be recorded as absence.

If you miss the first day of class or any two consecutive days after that without communicating with the instructor, you may be dropped.

Students who, because of excessive absences, cannot complete the course successfully, are required to 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". Do not stop attending and assume that you will be withdrawn from the class by the instructor.

The student is responsible for all assignments, changes in assignments, or other verbal or written information given in the class, whether in attendance or not. There will be some kind of assessment almost nearly every day as part of the classroom presentation. These may not be made up if you miss class (you may attend the other section of the course on the same day provided that there are available seats).

If a student must miss class, the student should notify the instructor by Canvas or email. Do not call the instructor and leave a message as he will not get it in time to do anything about it.

If you are going to miss an exam, you may choose to take it early. However, if you do not show up on the day of an exam, then I will automatically place your test in the testing center and then you have until the start of the second class period after the scheduled exam to make it up. You do not need to contact the instructor for this to happen. However, if you know that you are going to miss an exam and the days following the exam, then you will definitely want to talk to the instructor to take the exam early.

Time Requirements

In [34 CFR 600.2](#), the federal government requires that the amount of student work for a credit hour reasonably approximates not less than one hour of class and two hours of out-of-class work per week for each semester hour and that a 50 minute period is acceptable for class or lecture.

Richland considers the minimal meeting time as 50 minutes per week for 15 weeks for each credit hour. This means that you should expect to spend a minimum of 150 minutes a week for each credit hour.

Credit Hours for Course	3 credits	4 credits	5 credits
Classroom time per week (minutes)	150	200	250
Outside time per week (minutes)	300	400	500
Minimum time per week (minutes)	450	600	750
Minimum time per week (hours)	7.50	10.00	12.50
Minimum time for semester (hours)	112.50	150.00	187.50

If you are taking 16 credit hours, then you should expect to spend at least 40 hours a week on course work. That is the equivalent of a full-time job. The government considers that if you are taking 16 credit hours, then being a student is your full-time job.

According to the federal regulations, this target is a minimum, not an average.

Failure of the course to meet these time requirements could result in loss of program integrity, forcing the college to recover federal financial aid, and ultimately loss of accreditation.

At face value, it sounds overwhelming and impossible, but the time outside the class includes reading the book, watching videos, working on homework and projects, and participating in discussions.

The point is to manage your time effectively so that you don't feel the course is overwhelming.

Technology

The use of technology in this course is consistent with the Technology Statement in the [Illinois Mathematics & Computer Science Articulation Guide](#) (IMACC, 2019, p. 2). Technology is used to enhance the learning of Calculus, but it is not the focus of the instruction. There will be instances when we will use the calculator or computer to aid in our understanding or remove some of the tediousness of the calculations (especially in the area of numerical approximations). There may be some projects, homework, or portions of a test that require you to use technology to complete.

Here are some of the technology tools that we may use.

WebAssign

WebAssign is an online homework and grading system. Stewart's Calculus text is available in WebAssign as an enhanced electronic version. The full text of the book is there as well as tutorials, videos, and explorations. WebAssign is available at <https://www.webassign.net/>

Calculator

This class is a mathematics class and a graphing calculator is required. A scientific calculator is not sufficient. The calculator should be capable of graphing functions, finding roots, maximums, and minimums from a graph, displaying tables of values, and finding the definite integral numerically. A Texas Instruments TI-84 or TI 83 is the recommended calculator. That said, a TI-92, TI-89, or TI Nspire CAS calculator is recommended for this course if you plan on taking additional calculus or engineering courses.

You may use a graphing calculator from another company like Casio, but you will be responsible for figuring out how to use it.

Calculators may be used to do homework and may be used on exams and/or quizzes in class unless otherwise announced. **Microsoft Excel**

This spreadsheet application is useful for numerical methods such as Newton's Method, the Trapezoid Rule, Simpson's Rule, and Euler's Method. Microsoft Excel is part of Microsoft Office, which is loaded on all of the student computers at Richland. Current Richland students can obtain Microsoft Office without additional charge as part of the Microsoft Student Advantage program. For more information on obtaining Microsoft Office, log into MyRichland and look for Microsoft Advantage or visit the or site directly at

<https://jics.richland.edu/MicrosoftStudentAdvantage/>

Maxima

Maxima is an open-source computer algebra system that is free for you to download and use at home. It is available for Windows, Mac, Linux, and Android at <http://maxima.sourceforge.net/>

WinPlot

WinPlot is a free graphing software package for Windows written by the late Rick Parris at Phillips Exeter Academy in Exeter, New Hampshire. The software is useful for creating graphs and it is easy to copy/paste the graphs into other applications. Exeter Academy maintained the server with the software for about 4 years after Parris' death, but the site is no longer available. To download the software, visit the instructor's Mathematical Software page at <https://people.richland.edu/james/software>

DPGraph

DPGraph is a 3D graphing package, written by David Parker, that will be useful for visualizing the graphs of multi-variable functions. The software is not free, but Richland has a site license that allows students to download and use it without additional charge. You may download it from <http://www.dpgraph.com/graphing-users.html> (be sure to find the entry for Richland Community College)

CalcPlot3D

This is an online 3D graphing calculator Java applet written by Paul Seeburger at Monroe Community College in Rochester, NY. It allows you to visualize vectors, space curves, surfaces, normal lines, tangent planes, and contour plots. It is available online at <https://www.monroecc.edu/faculty/pauseeburger/calcsnf/CalcPlot3D>

Google Drive

Google Drive (formerly Google Docs) is a multi-user office suite that has word processing, spreadsheets, drawings, and presentation capabilities. We will use this for collaborating on our technology projects. It works best if you have Gmail account. It is available at <https://drive.google.com> although it is easily accessed from your Gmail account.

Additional Supplies

The student should bring a pencil, paper, and calculator to class each day. You may occasionally want a ruler or graph paper. There will be a paper punch and stapler in the classroom.

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.

You may use a recording device to record the lectures. Feel free to use a camera or cell phone to take pictures of the boards if you have trouble getting all of the information into your notes.

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.

Mathematics Enrichment Center

The Mathematics Enrichment Center, located in S118, provides free walk-in tutoring for mathematics courses.

Academic Success Center

The Academic Success Center consolidates several student services into one area. It is located in the south wing of the first floor next to the Kitty Lindsay Learning Resources Center (library).

Testing

The testing center is located in room N114. You must provide a photo identification and know the name of your instructor to use this service.

Tutoring

The tutoring center provides tutoring on a walk-in or appointment basis in room C148. Students seeking mathematics tutoring should visit the Mathematics Enrichment Center.

Accommodations

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 C148. If you request an accommodation, you will be required to provide documentation that you need that accommodation.

Online Learning

Despite the title, Online Learning provides help with much more than just your online courses. They provide technical support for students including answering questions about Canvas, myRichland, e-mail, cell phones, tablets, and laptops. They can also help troubleshoot your computer issues and make sure your computer is ready for course work.

They are located in room W143, but the best way to contact them is through the "Help" link in the lower-left corner of Canvas or at <http://www.richland.edu/online/helpdesk>.

Open Computer Labs

Students often wish to know where, besides the classroom, they can go to use the software. There are computers located in the Learning Resources Center and in the Academic Success Center that you may use.

Richland Thrive

Richland Thrive is an implementation of an early-alert identification and intervention system powered by the Hobsons' Starfish software. The software is designed to help students achieve academic success, retention, and graduation.

When academic indicators suggest a student may be experiencing difficulties that may negatively impact academic success, the instructor may raise a referral flag that notifies the student of concern through an email to the student's Richland email, requests a Student Success Coach or Student Success staff member contact the student to discuss and follow-up on the issue, or encourages student to discuss the matter with the instructor.

If you receive an email notification of a referral flag in any of your courses, you are encouraged to contact the instructor as soon as possible to discuss the issue. The purpose of the discussion is to accurately assess its potential impact on your academic success and to plan and put into action steps to be successful in the course. For more information about the Richland Thrive system, contact the Student Success Center at ext. 6267

College & Division Policies

Academic Integrity Policy

All students are expected to maintain academic integrity in their academic work and honesty in all dealings with the College. 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.

The Academic Integrity Policy also governs student misuse of intellectual property.

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.

Copyright Notice

The materials used in this course are protected by Copyright law. Faculty lectures, course supplementary materials, articles, quizzes and exams, papers, data, web pages, and artwork are among the properties protected. This is not an exhaustive list. Items may or may not be marked with a Copyright symbol ©. Regardless, the intellectual property used in this course is owned by the creator who is the sole determiner of how the property is used, including but not limited to copying, distribution, performance, display, or revisions.

Any questions a student may have about the use of course materials can be explained by the instructor or library staff.

Student misuse of intellectual property is subject to the Academic Integrity Policy as explained in the Student Handbook and Section 5.9 of the Board Policy Manual.

Title IX and Sexual Misconduct

Richland Community College is committed to providing a safe learning environment for all students that is free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone.

All Richland Community College faculty members are "responsible employees," which means that if you tell us about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, we must share that information with the Title IX Coordinator. Although we have to make that notification, you will control how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you

are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone privately, you can contact Growing Strong Sexual Assault Center at 217-428-0770.

More information about Title IX can be found at www.richland.edu/security. Richland's Title IX Coordinator is Alex Berry, email: aberry@richland.edu, office: N105, phone: 217-875-7211, ext. 6314.

Electronic Communication Devices Policy

The Mathematics and Sciences Division prohibits the use of cell phones, pagers, and other non-learning electronic communication equipment within the classroom. All equipment must be turned off to avoid disturbances to the learning environment. If a student uses these devices during an examination, quiz, or any graded activity, the instructor reserves the right to issue no credit for these assignments. The instructor needs to approve any exceptions to this policy.

Richland Community College Core Values

- Commitment - We are dedicated to meeting the needs of the communities we serve.
- Respect - We recognize the expertise of all members of the College community and encourage individual contributions.
- Excellence - We strive to develop and pursue higher standards.
- Accountability - We assume and demonstrate responsibility for our actions.
- Diversity - We believe that our similarities and differences are opportunities for establishing a common bond and strengthening the College.

Other College Services

There are some additional services that Richland provides to its students. While they may not directly pertain to this class, you may benefit from them.

Learning Feedback System

At the end of each semester, students are invited to provide feedback to their instructors about the course. This includes things that went well and opportunities for improvement. This online feedback is anonymous and the instructor won't see it until grades have been turned in.

The Learning Feedback System (LFS) is primarily intended to provide feedback to the instructor. However, if you have a issues or concerns, you should not wait until the end of the semester to talk to your instructor. Please come to me at any time. The feedback system is available at <https://people.richland.edu/feedback>.

myRichland

myRichland is the student information system portal and is located at <https://my.richland.edu>.

You may use it to find the course schedule, register for classes, check your grades, obtain unofficial transcripts, review financial aid, and other student services.

Library

The Learning Resources Center (LRC) has print and electronic resources available. They offer research assistance and information literacy sessions; they also have individual and group study areas.

Student Success Center

The Student Success Center, in room N117, is designed to be a one-stop shop for most student services. These include advising and registration, career services, counseling services, financial aid, veteran affairs, student records, and the transfer center.

The Student Success Center has coffee and snacks available daily, school supplies such as paper, pens, and highlighters, and personal supplies such as toothpaste, toothbrushes, and cough drops.

A few other student services are located in other rooms of the main building. These include Campus Life, which supports new student orientation, clubs, organizations, and student leadership, and the TRiO program that offers academic and personal support to first-generation, low-income, and students with disabilities.

Office of Student Engagement

The Office of Student Engagement, in room C133, has a Snack Center to provide grab-and-go food for students who were short on cash while on campus or who did not have time to grab a meal before coming to campus. The office also has personal supplies such as condoms and menstrual products available for students.

The Gender Inclusive/Family bathroom and many women's bathrooms are also stocked with complimentary menstrual products.

Food Pantry

In addition to the snacks in the Student Success Center and the Office of Student Engagement, Richland has partnered with The Good Samaritan Inn to create The Pantry at Richland Community College. If you are a student facing food insecurity, please complete the referral form at <http://bit.ly/2ykuGUL> or visit the Student Success Center.

Directory of Student Services

The main phone number for Richland Community College is 217-875-7211 or 217-875-7200. This is an automated system available 24 hours a day.

Student Service	Location	Extension
Accommodations	C148	6379
Campus Life	C131	6243
Career Services	N117	6267
Cashier	N117	6227, 6226
Counseling Services	N117	6267
Financial Aid	N117	6271
Library	C152	6303
Mathematics Enrichment Center	S118	6383
Online Learning Support	W143	6376
Registration and Enrollment	N116	6267
Student Employment	N103	6305
Student Engagement	C131	6243
Student Records	N117	6267
Student Support Services/TRiO Program	C143	6440
Testing	N114	6238
Transfer Center	N117	6438
Tutoring	C148	6379
Veterans' Affairs	N117	6205

Weekly Calendar

This course does not run on a calendar week basis. This chart is provided as a convenience for students who organize their life by calendar week.

Students will receive a separate daily calendar that contains the section numbers covered each day as well as the due dates for major activities. Due dates are also listed in Canvas.

Week 1, August 15–18 **Vectors**

- Three-dimensional coordinate systems, distance formula, spheres

Week 2, August 19–25 **Vectors**

- Vectors, scalar multiplication, norm of a vector, properties, applications
- Dot products, properties, angle between vectors, orthogonality, projections
- Cross products, parallelograms, scalar triple product, parallelepipeds, applications

- Week 3, August 26–September 1** **Vectors**
- Equations of lines and planes, vector form of line, symmetric form of line, equation of plane, distance between point and plane
 - Cylinders and quadric surfaces: ellipsoids, paraboloids, hyperboloids, cones
- Week 4, September 2–8** **Vectors**
- Vector functions and space curves: limits, continuity, derivatives, integrals
 - Arc length, curvature, parametrization with respect to arc length
- Week 5, September 9–15** **Vectors**
- Motion in space: velocity and acceleration, tangential and normal components of acceleration
 - *Review and Exam 1: Vectors and the Geometry of Space*
- Week 6, September 16–22** **Partial Derivatives**
- Functions of several variables, graphs, level curves, level surfaces
 - Limits and continuity
 - Partial derivatives, notation, interpretation, Clairaut's theorem
- Week 7, September 23–29** **Partial Derivatives**
- Tangent planes, linear approximations, differentials, total differential
 - Chain rule, implicit differentiation
 - Directional derivatives, gradient vector, maximizing directional derivatives, tangent planes and normal lines to surfaces
- Week 8, September 30–October 6** **Partial Derivatives**
- Maximum and minimum values, second derivative test, saddle points, absolute max and min, extreme value theorem
 - Lagrange multipliers: one and two constraints
 - *Review 2: Partial Derivatives*
- Week 9, October 7–13** **Multiple Integrals**
- *Exam 2: Partial Derivatives*
 - Double integrals over rectangular regions, volume as a double integral, iterated integrals, Fubini's theorem
- Week 10, October 14–20** **Multiple Integrals**
- Double integrals over general regions, type I and type II regions
 - Double integrals in polar coordinates, mention of Jacobian

Week 11, October 21–27 Multiple Integrals

- Applications of double integrals, moments and centers of mass, moment of inertia
- Triple integrals and their applications
- Triple integrals in cylindrical coordinates, more about Jacobian
- Triple integrals in spherical coordinates, more about Jacobian
- Change of variables in multiple integrals, Jacobian

Week 12, October 28–November 3. Multiple Integrals

- Double integrals over general regions, type I and type II regions
- Double integrals in polar coordinates, mention of Jacobian

Week 13, November 4–10 Multiple Integrals

- *Review and Exam 3: Multiple Integrals*
- Vector fields, gradient fields

Week 14, November 11–17 Vector Calculus

- Line integrals, piecewise smooth curves, work

Week 15, November 18–24 Vector Calculus

- Fundamental theorem for line integrals, independence of path, conservative vector field, potential functions
- Green's theorem, oriented paths, area as a line integral
- Curl and divergence

Week 16, November 25–December 1 Vector Calculus

- Parametric surfaces, surfaces of revolution, tangent planes, surface area
- Surface integrals, oriented surfaces, flux

Week 17, December 2–8 Vector Calculus

- Stokes' theorem
- Divergence theorem
- *Review for Comprehensive Final Examination*

Week 18, December 9–15 Finals

- *Comprehensive Final Examination*