

CONTACT INFORMATION	
<b>Professor:</b> Dr. Laura K. Gross	<b>Email:</b> <a href="mailto:laura.gross@bridgew.edu">laura.gross@bridgew.edu</a>
<b>Office:</b> DMF 349	<b>Class:</b> MW 1:50-3:05 in DMF 359.
<b>Phone:</b> (508) 531-2391	<b>Office Hours:</b> M 9:30-10:30 in the Center for Multicultural Affairs (CMA), MTR 3:30-4:30 in my office. (See below.)

<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday/Friday</i>
<b>Office hours</b> 9:30-10:30 <b>RCC 101</b>			
<b>COMP 150-001</b> 1:50-3:05 DMF 359		<b>COMP 150-001</b> 1:50-3:05 DMF 359	
<b>Office Hours</b> 3:30-4:30 DMF 349	<b>Office Hours</b> 3:30-4:30 DMF 349		<b>Office Hours</b> 3:30-4:30 DMF 349

COURSE DESCRIPTION & PREREQUISITES
<p>In this course, you will learn to program a computer in the language R, which is widely used in the data-analysis industry, as well as academia. You will also learn to use the mathematical software Sage, which is another useful open-source tool in your mathematics toolbox. <i>If you are considering a career as a computer programmer or a computer-science teacher at the secondary level, take COMP 151, which is an introductory programming course designed for computer-science majors.</i></p> <p>In the first part of the course, you will develop algorithms (precise methods) to solve problems. You will implement them by writing computer programs in the language R. <b>Programming</b> will involve combining input, output, and control structures, including via repetition and decision structures. In the second part of our course, you will exploit the <b>computer algebra</b> system (CAS) Sage to analyze and solve mathematical problems by doing arithmetic and calculus, defining and manipulating mathematical expressions, evaluating functions, solving equations, and creating graphs. You may also explore higher-level topics of your choosing.</p> <p><i>Prerequisite:</i> MATH 161 or MATH 141, which may be taken concurrently. You may also place into the course with transfer credit approved by the Chair of the Mathematics Department. If you have already taken a course or already have the skills that you think might meet the computing requirement in the mathematics major, please see me.</p> <p><i>Notes:</i> This course recently underwent a change of number from COMP 203 to COMP 150. Students who have successfully completed COMP 203 should not enroll in this course. COMP 150 has different content from COMP 151, and mathematics majors can gain valuable skills in either or both courses. See me for further discussion.</p>

COURSE MATERIALS	
<b>Text</b>	<i>Sage for Undergraduates</i> (online version) by Gregory V. Bard (2010)
<b>Electronic Materials</b>	<p><b>Blackboard.</b> Go to <a href="http://blackboard.bridgew.edu">http://blackboard.bridgew.edu</a>, and login with your BSU userid and password. You will see you are enrolled in COMP 150-001 as a Blackboard course.</p> <p><b>Computer.</b> For this class, you will need to use your own laptop or desktop computer. Campus and public-library computers may be used for the Sage portion of the course if desired. Please see me if you have a concern about computer access.</p> <p><b>R and RStudio.</b> For this class, we will use the statistical software R the integrated development environment RStudio. Please follow these steps to get access to these free tools on your laptop: (1) Download R at <a href="https://cran.r-project.org/">https://cran.r-project.org/</a> for Windows or Mac as appropriate. (2) Download RStudio at <a href="https://www.rstudio.com/products/rstudio/download/">https://www.rstudio.com/products/rstudio/download/</a>, selecting the free option.</p> <p><b>Sage.</b> You will start off with the Sage Cell Server at <a href="https://sagecell.sagemath.org/">https://sagecell.sagemath.org/</a>, which is somewhat like a calculator screen that lets you view output and type instructions. Next you will modify and create “worksheets” at a website CoCalc, following directions you will receive in email.</p>
<b>Notebook</b>	<p>You need a notebook or some analogous tool for writing down goals, mapping out assignment solutions, doing scratch work, recording key words, and quizzing yourself, as well as carrying out the programming process. Make sure you can use your work in the notebook to explain to your colleagues and instructor how you approached and executed each assignment.</p> <p>You may wish to visit School Supplies 4 U for miscellaneous free items in Maxwell Library by the copy machines on the first-floor level. This service is available to all and is designed for those who may be financially insecure.</p>

<b>COURSE ORIENTATION</b>	
<b>Course Navigation</b>	Visit our Blackboard course site for documents such as this syllabus and other resources. See the current week (e.g., <i>Week 2 – Wednesday, September 6</i> ) of the site to view the assigned readings, explorations, and assignments. 
<b>Weekly Rhythm</b>	In this course, each week begins on a Wednesday (because Wednesday is the first day of class), and assignments generally come due Wednesday by class time. Engage in the course daily, including between Wednesday and Monday. See the document <a href="#">Learning Outcomes and Schedule</a> .
<b>Expected Time Commitment</b>	Devote approximately nine hours per week on average to course readings, explorations, class meetings, and learning activities. Please engage in course activities daily.
<b>Power Sessions</b>	The literature on successful learning shows the effectiveness of doing short “power sessions” of practice and engagement at least once per day each day, e.g., preview and set achievable goals (5 minutes), do focused work free of distractions (20 minutes), look away from course materials and recall and explain your work (5 minutes).
<b>Learning Outcomes and Schedule</b>	Please see the document <a href="#">Learning Outcomes and Schedule</a> for course goals, as well as a list of the weekly modules and their associated learning outcomes. The document also gives details on the weekly rhythm and reiterates the course description in this syllabus.

<b>CLASS ASSIGNMENTS</b>	
<b>Participation</b>	This class provides you with peer interaction and expert supervised practice with programming and computer algebra. Please arrive on time, persist to the end of class, and concentrate during class, free of phones, recreational internet, and other distractions. Attending class and focusing your attention will help you learn and do well in the course. If you will be absent, please contact me in advance if possible, and take responsibility for catching up promptly on what you missed by consulting Blackboard and a colleague in the class.
<b>R/Sage Assignments</b>	<p>Assignments requiring R and/or Sage will be assigned approximately once a week. Assignments will cultivate your skills in analyzing problems, specifying solutions, designing algorithms and writing, testing, and revising code. <b>Start your assignment immediately after it is posted at the start of the week (Wednesday)</b> in order to have ample time to analyze, specify, design, implement, correct, and ask questions. While you read and explore the class materials for the week, you should work concurrently on the assignment.</p> <p>You will submit assignments by uploading your work to Blackboard or preparing your work of my collection at the CoCalc site as instructed. Submit your assignment as promptly as possible and no later than Wednesday at the start of class. Assignments will receive points according to a rubric. You can check your grade in the grade-book portion of our Blackboard course site.</p> <p>Contact me in advance of deadlines with requests for extensions if needed.</p>

	<p>Sometimes there is wiggle room in the schedule. (The issue is the time I have available for grading.) Note that late homework may be returned (extremely) late because of scheduling constraints.</p> <p>Assignments each emphasize key course concepts, and programming requires progressively more constructs. Grades for <b>all assignments will count</b> in your final grade. As always, speak with me if you have any questions or concerns.</p>
<p><b>Presentations</b></p>	<p>You will present a problem from prior assignments approximately once a week to share your insights, to promote communication within the class, to increase the comfort of the class with the material, for spaced practice and recall for the presenter and the audience, to show your own understanding, and to foster your communication skills. The presentations will generally take place on Mondays.</p> <p>The task will consist of sharing your thinking at the board in collaboration with a colleague. You will <b>describe your problem-solving process</b>, rather than writing code or “answers” on the board. If one partner writes, the other may be asked to explain the work orally. If you are not called to the board to write or speak, you will be asked to raise a question about a particular problem or to summarize it. (Your question does not count in any way against the presenter. It is okay if the presenter can’t answer it; I can.) Assignments will receive points according to a rubric. You can check your grade in the grade-book portion of our Blackboard course site.</p> <p>Presentations generally must take place on the day assigned. At the end of the semester, I will drop your lowest presentation grade. The dropped grade may be a zero from an excused absence.</p>
<p><b>Exercises</b></p>	<p>Exercises will take place approximately once a week and require you to generate new ideas and put them to use. Some will involve collaboration with colleagues during class. Submit your exercise as promptly as possible and no later than Wednesday at the start of class. Your exercise will typically receive points on a ten-point scale corresponding to the accuracy of your work. You can check your grade in the grade-book portion of our Blackboard course site.</p> <p>Contact me in advance of deadlines with requests for extensions if needed. Sometimes there is wiggle room in the schedule. (The issue is the time I have available for grading.) Note that late exercises may be returned (extremely) late because of scheduling constraints.</p> <p>At the end of the semester, I will drop the lowest exercise grade. A dropped grade may be a zero from an excused absence.</p>
<p><b>R Application Assignment</b></p>	<p>In the programming application assignment, you will program in the context of another subject, perhaps Calculus I or statistics. Links to relevant resources will be provided on Blackboard. Possible topics are Newton’s Method, Simpson’s Rule, numerical integration (such as the Trapezoidal Rule), the Riemann sum, numerical limits, and convergence of infinite series. If you have studied statistics, I encourage you to explore statistical concepts (such as manipulation of data frames, creation of statistical graphs, characterization of shape, center, and spread of data, calculation of p-values, calculation of confidence intervals, or simulation via sampling). Please seek my approval of your topic.</p> <p>The objective is to write an introduction to the topic under consideration. Your</p>

	<p>introduction may look very similar to a section in a calculus or statistics textbook, except that the target audience is a student who can program in R. You will not need to show hand calculation.</p> <p>This modest assignment will give you a framework for applying programming, applying your communication skills in mathematics and computer science, locating/analyzing/synthesizing information, and pointing a reader to your subject-matter sources, such as a calculus text. The assignment is designed to be tractable, low-stakes, and---yes---enjoyable and rewarding!</p>
<p><b>Sage Application Presentation</b></p>	<p>In the Sage Application Presentation, you will create and discuss a Sage worksheet of about five questions that you have formulated yourself, pertaining to a topic of interest to you, perhaps material from another class you are taking or have taken. Make sure to convey the significance of these questions. Sample subjects from which to draw include Calculus I, II, and III, linear algebra, differential equations, and set operations (set, union, intersection, minus, complement).</p> <p>This modest assignment will give you a framework for applying a computer algebra system, applying your communication skills in mathematics and computer science, locating/analyzing/synthesizing information, and pointing an audience member to further resources. The assignment is designed to be tractable, low-stakes, and---yes---enjoyable and rewarding!</p>
<p><b>Midterm Quizzes and Final Exam</b></p>	<p>We will have three 50-minute quizzes in class during the term. Two programming quizzes will require you to predict what given instructions and functions do, including detect errors, as well as suggest corrections and improvements---all without testing the code on the computer. When learning languages, students need to write and speak to express themselves---but also read, listen to, interpret, and respond to others' ideas. On quizzes, you will demonstrate your skills in critically reading computer code. A Sage quiz will require you to solve problems on a Sage worksheet during class time. Quizzes will be graded item-by-item out of the number of points indicated. You can check your grade in the grade-book portion of our Blackboard course site.</p> <p>If illness or emergency will prevent you from taking a quiz, please call or notify me in advance if possible---Otherwise follow up with me within 24 hours of the missed quiz, and provide a written medical excuse or other documentation. Students providing a written medical excuse will have the opportunity to reschedule the quiz within a reasonable amount of time.</p> <p>A mandatory final exam will take place during final-exam week. Final exams must be taken on the scheduled day, in general.</p>

<p style="text-align: center;"><b>CLASS POLICIES</b></p>	
<p><b>Academic Honesty</b></p>	<p>In this course, I will often encourage collaboration on exercises and presentations, and I will explain my expectations. <b>Programming and computer-algebra 50-point assignments must follow strict guidelines for independent work.</b> I may ask you to attach an academic-honesty statement to your assignments to show you understand and have complied with the policy</p>

	<p>below.</p> <p>In particular, <b>rely on yourself for assignments</b>, rather than consulting other people for analysis, design, implementation, and error correction. To learn to program and to be successful on the quizzes and the final, you must be able to carry out all of these steps independently.</p> <p><b>What if you are stuck?</b> If you are stuck for, say, two power sessions, you have made a good initial investment in problem solving, and you are permitted to seek suggestions. Do not seek or look at anyone else’s solution or let anyone type on your keyboard. In addition, you must <b>describe ON YOUR ASSIGNMENT SUBMISSION the circumstances</b> (like being stuck for two power sessions), <b>the source (in detail) and your consultation with the source</b>. Write up your work by yourself.</p> <p><b>What if someone asks me for help?</b> Use your best judgment about whether the proposed conversation complies with this policy. If you agree to collaborate, you may give suggestions only by discussing notes on the problem with your colleague---without showing your own R or Sage code or your own solutions or typing on anyone else’s keyboard. In addition, you must <b>describe ON YOUR ASSIGNMENT SUBMISSION the circumstances</b> (like being approached by someone who was stuck for two power sessions), <b>with whom you worked, and the contents of your discussion</b>. <b>Ask me if you would like my guidance</b>. Students must write up their work by themselves.</p> <p>Comply with these terms to ensure academic honesty and to avoid a failing grade for the work. The Chair of the Mathematics and Computer-Science Departments and the Associate Provost for Faculty Affairs will be informed of violations of these terms because these administrators uphold the academic integrity of the departments and institution and want to help students conduct themselves with academic integrity.</p> <p>Avoid cheating, plagiarism, dishonest practices, or disruptive behavior in accordance with the University Academic Integrity Policy at <a href="http://catalog.bridgew.edu/content.php?catoid=10&amp;navoid=970">http://catalog.bridgew.edu/content.php?catoid=10&amp;navoid=970</a> .</p>
<p><b>Email Use</b></p>	<p>I will post announcements through Blackboard and may also send you email through the Blackboard site. You are responsible for checking Blackboard and your email. Like the Office of Academic Affairs, I hold you responsible for reading your BSU email. Be aware that the Information Technology help desk provides support for email to and from your bridgew.edu address only.</p>

<p style="text-align: center;">ASSISTANCE</p>	
<p><b>Acknowledgement of Assistance</b></p>	<p>If you get any assistance on the course subject matter or assignments, make sure you <b>describe this assistance</b>. See Academic Honesty above.</p>
<p><b>Instructor</b></p>	<p>Feel free to communicate with me by email and telephone. Please remind me to reply if I do not answer within 48 hours.</p>
<p><b>Tutor</b></p>	<p>If you wish, you may work with a tutor at no cost in the AAC. Walk-in</p>

	tutoring is available over 40 hours during the work week. See <a href="https://my.bridgew.edu/departments/MathServices/SitePages/Home.aspx">https://my.bridgew.edu/departments/MathServices/SitePages/Home.aspx</a> for more information, including tutors' schedules. (Go to the Student Portal, then the Intranet, then Departments, then Math Services.) Although the tutors at Math Services do not necessarily have a background in R or Sage, some may be able to do some brainstorming with you. <b>You are responsible for showing tutors at the AAC the academic-honesty policies from this syllabus.</b>
<b>Technical Support</b>	You can get BSU information-technology support by calling (508) 531-2555, emailing <a href="mailto:itsupport@bridgew.edu">itsupport@bridgew.edu</a> , or visiting the Support Services Center in Maxwell Library basement level or Moakley Center (MKC) Room 130. Note the staff will not necessarily have detailed knowledge of R or Sage. You can join and use the <a href="#">forum for Sage/CoCalc support</a> or email <a href="mailto:help@sagemath.com">help@sagemath.com</a> to get developer help. Remember, these resources are for tech support. For questions related to course content and assignments, please review the Academic Honesty policy above.
<b>Study-Skills Guidance</b>	At the AAC you can get invaluable help with study skills at Academic Coaching and Research Services. Go to the Tutoring Central desk for more information.
<b>Disability Accommodation</b>	BSU is committed to ensuring equal access to all. The University offers a number of services to students who have a documented medical condition, are physically challenged, or have psychological or learning disabilities. If you think you may have a learning disability or wish to request support services, please contact the Office of Disability Resources in the Academic Achievement Center, Maxwell Library at (508) 531-2194. You can receive services even after the semester has begun.
<b>Campus Safety</b>	The Office of Equal Opportunity and the Title IX Coordinator work to ensure that the campus community flourishes in a supportive and fair climate. (See <a href="https://my.bridgew.edu/departments/affirmativeaction/SitePages/Home.aspx">https://my.bridgew.edu/departments/affirmativeaction/SitePages/Home.aspx</a> .) Note the site provides a link to "initiate an investigation of alleged discrimination, harassment, sexual or gender-harassment, domestic or dating violence, stalking or retaliation..." (The form says it "is unlawful to retaliate against a student, employee or any other person affiliated with the University for filing a complaint or for cooperating in an investigation of a complaint.")

**TENTATIVE GRADING SCALE WITH PLUS/MINUS GRADES AT INSTRUCTOR DISCRETION**

<b>A/A-</b> 90-100	<b>B+/B/B-</b> 80-89	<b>C+/C/C-</b> 70-79	<b>D+/D/D-</b> 60-69	<b>F</b> 0-59
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**COURSE GRADES**

R/Sage Assignments (all count)	10%
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Presentations (one is dropped)	10%
Exercises (one is dropped)	10%
R Application Assignment	10%
Sage Application Presentation	10%
Quizzes	Three at 10% each
Final Exam	Two parts at 10% each

<b>DATES AND DEADLINES</b>	
First Day of Classes	Wednesday, September 5
Last day to drop/add classes	Wednesday, September 12
Last day to withdraw with 85% refund	Tuesday, September 18
Last day to withdraw with 70% refund	Tuesday, September 25
Columbus Day – No classes	Monday, October 8
Veterans’ Day – No classes	Monday, November 12
<b>UNIVERSITY ON A MONDAY SCHEDULE</b>	Wednesday, November 14
Last Day to withdraw	Friday, November 16
Thanksgiving Break – No classes	Thursday, November 22— Friday, November 23
Last Day of Classes	Wednesday, December 12
Final Exams	Friday, December 14— Thursday, December 20
<b>Our Final Exam</b>	<b>Monday, December 17, 11:00 a.m.--1:00 p.m.</b>