**121:520:01, 645:578:01, 640:466:01**

**Essential of Biomathematics I**

**Mathematical Methods in Systems Biology I**

**121:523**

**Essential of Biomathematics I Recitation**

**Spring 2022**

**Instructors:**

Benedetto Piccoli, Department of Mathematics and CCIB.

Sean McQuade, CCIB.

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**Executive summary**

*Classes***.** Monday6:00-8:40pm.

*Recitations.* Wednesday 12:30-1:30pm, 2:05-3:00pm.

Armitage 212 (Zoom up to end of January).

*Textbook*. Notes and material on Canvas.

*Assessment.*

|  |  |  |  |
| --- | --- | --- | --- |
| Assignment | Point value | Number | Total |
| Pre-Quiz | 50 | 13 modules | 650 |
| Reading Quiz | 100 | 13 modules | 1300 |
| Module Quiz | 200 | 13 modules | 2600 |
| Posted exercise/discussion | 500 | 7 exercise/discussion | 3500 |
| Final Project | 2000 | 1 final project | 2000 |
|  |  |  | 10050 |

## **Course Description**

The course will provide an introduction to mathematical methods for systems biology. The first part of the course will focus on linear algebra, the second part on graph theory and probability. Last part will deal with difference and ordinary differential equations. Examples will be provided from of biological and bio-medical applications. The latter will range from classical prey-predator populations examples to biological networks.

## **Learning Objectives**

* Acquire knowledge of mathematical tools from linear algebra, probability, graphs and differential equations.
* Develop skills of mathematical modeling for biological system linking course content to examples.
* Develop capability of work in a team with peers.
* Critically analyze scientific publications.
* Improve skills on presentation of scientific papers and results.

## **Required Textbook(s)**

## Notes and other material from instructor on Canvas site.

**January Online Format**

This course offers readings, lecture material, frequent assessments, and online activities, including active discussions and exercises. There are no scheduled meeting times, but deadlines are strictly enforced, as students work together to achieve learning objectives. The class follows a rigorous schedule and you should expect to be working at least as many hours as with a traditionally-scheduled class. Plan to log into Canvas at least a few times a week to complete activities for this course.

**February-May In Person Format With Online Supplement**

Online offerings, lecture material and assessments will continue throughout the semester. In addition, there will also be **lectures in person beginning February**. The in person lectures occur on **Mondays 6:00pm to 8:50pm at Armitage room 212.** The recitation that accompanies this course will also meet in person starting in February. The recitations occur on **Wednesdays 12:30pm to 1:30pm** or **Wednesdays 2:05pm to 3:05pm** depending on which one has been added to your Academic schedule.

As much as possible, we will try to stick with a consistent schedule during the week:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| M | Tu | W | Th | F | Sa | Su |
| Module | | | | | | |
| Complete pre-quiz (before class) |  | Reading-quiz due | Discussion/  exercise due  (Voicethread) | Module-quiz  due |  | Any other assignment due |
| Class 6:00pm |  | Recitations  12:30pm  2:05pm |  |  |  |  |

## **Communication guidelines**

We want to help you succeed in this course and do the best that you can! Please don’t hesitate to reach out to me throughout the semester with any questions or concerns you may have. It’s a good thing to ask for help–it means you’re paying attention and you know what you need–and you are not bothering me.

#### **Email**

Please direct all general course questions to the “General Course Questions” discussion board in Canvas (available in the Course Essentials module). Check both the syllabus and the discussion board before asking a question. Personal questions regarding grades or individual assignments should not be addressed in Canvas; please email me these questions. If you need to email me, be sure to include your full name and the course title. Depending on when you send your email, you can expect a response:

* Monday-Friday: within 24-48 hours (if between the hours of 8am and 6pm, it will likely be sooner).
* Weekend emails: I’ll respond within 48-72 hours.
* Emails received between 8pm and 7am will likely not be addressed until the morning.

If you do not receive a response from me within the above listed time frame, please send the email again.

#### **Office hours**

Office hours will be by appointment only and usually need at least 48 hours’ notice. We can meet via web conference (using Zoom) or talk over the phone. If you’d like to request an appointment, email me. Please include the reason why you’d like to meet in your email.

## 

## **What you can expect from me in this course**

Before I talk about what you’ll be doing in the course, I’d like to review what you can expect from me as your professor. Learning can be uncomfortable and stressful at times–I would argue that if it weren’t, you might not be learning that much! However, I do want to help make sure that you make progress and persist through the course, and don’t feel discouraged or overwhelmed. To do this, you can expect me to:

* Communicate with the whole class using Announcements in Canvas to review progress and reminders. Please make sure your [Canvas Notifications](https://community.canvaslms.com/docs/DOC-10624) are set to alert you to new Announcements immediately.
* Provide personal feedback on your major assignments in a timely fashion (usually within a week of submitting) to help you improve or continue to do well in the course.
* Meeting you personally via web conference at least once monthly.
* Respond to all of your email communications with me based on the communication guidelines above.
* Reach out to you–multiple times if needed! – if I notice that you’re falling behind or seem to be struggling. I want to help you succeed.
* Encourage you to strive for better and congratulate you on your achievements. I’m excited for us all to learn together.

## **Assessment**

There are a lot of assignments in this course, and you’re expected to engage with the content frequently because engagement and application are how we learn best. As long as you are putting forth your best effort and communicate with me when struggling, you should be able to succeed in this course.

|  |  |  |  |
| --- | --- | --- | --- |
| Assignment | Point value | Number | Total |
| Pre-Quiz | 50 | 13 modules | 650 |
| Reading Quiz | 100 | 13 modules | 1300 |
| Module Quiz | 200 | 13 modules | 2600 |
| Posted exercise/discussion | 500 | 7 exercise/discussion | 3500 |
| Final Project | 2000 | 1 final project | 2000 |
|  |  |  | 10050 |

The details about the Final Project are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Product | Description | Due Date | Points | Rubric |
| Paper proposal | Select paper form list or propose a new paper | 4/1-19 | Not graded | If new paper, need content related to course |
| Discussion and final choice | 1-1 or group session | 4/20-30 | 500 points | Final paper selected by student |
| Final report | Word document finalized  Include: introduction, results, methods, critique, references, impact | 5/9 | 1000 points | 600 pts content  200 pts layout/organization  200 pts impact section |
| Comments | Comments on at least two projects | 5/11 | 500 points | 250 pts content knowledge  250 pts feedback |

### **Late assignment guidelines**

Please let me know if you are struggling to keep up with the work. I know missing deadlines can be stressful! Sometimes it’s just a one-time thing and other times it can snowball. I don’t want you to get trapped in this cycle–I can help!

If you think you might miss a deadline:

1. Please contact me ahead of time if you believe you will not be able to complete an assignment on time to see if we can make other arrangements. This is always a better option than waiting after the due date for an assignment has passed!
2. Email me whatever you have before the deadline. If I have something from you, no matter how incomplete, the first day’s late penalty will be halved.
3. Keep in contact with me until you have finished. We can make a plan together to keep you on track.

Guidelines for assignment type unless we’ve been in touch as stated above:

* Voicethread: Late work is generally not accepted unless we’ve discussed this in advance; please contact me with this information within 48 hours of the assignment closing.
* Assignments: Any assignment will be accepted up to 24 hours late; one letter grade will be deducted.

## **Assignment Descriptions and Expectations**

### *Pre and reading quizzes*

Pre and reading quizzes will be in the form of multiple choices, multiple answers or grid selections.

### *Module quizzes*

Module reading quizzes will be in the form of multiple choices, multiple answers or grid selections.

### *Discussions/Exercises*

#### *Purpose*

The purpose of the discussions is to get you to think critically about the readings and the learned mathematical concepts. Similarly, the exercises serve to verify your comprehension of the content and increase your skills in using the taught concepts.

#### *Format*

The discussions and exercises will take place using Voicethread.

#### *When crafting your response, remember…*

* You should address the question(s) fully and draw connections to course content and your own experiences in your response.
* Please use mostly standard English grammar for your response. Occasional Internet slang or emoji/gif use is not completely prohibited, as I do understand this can help set the tone of your thoughts. And maybe emojis actually invade your thoughts on a daily basis at this point.

#### *Assessment: Discussion and exercises posted grading rubric*

|  |  |
| --- | --- |
| Fully Meeting or Exceeding Expectations  90-100 % | * Discussion post comprehensively addresses the topic, adds value to discussion with stimulating posts * Posts in-depth, incisive reflections that demonstrate critical thinking * Well-written posts made within required time frame * Responses are stimulating * Exercises show deep understanding of the topic * Use creativity in solutions of exercises |
| Somehow Meeting Expectations  80-89 % | * Discussion post is on-topic, relevant, and contain original content * Shows evidence of knowledge and understanding of content * Posts are submitted by deadlines, use complete sentences and rarely have grammar/spelling errors * Responds substantively to a classmate’s post |
| Emerging Towards Expectations  70-79 % | * Posts are on-topic, but may lack originality and/or fail to elicit reflections from or build on ideas of others; examples may be made but may be irrelevant or unclear how they connect to course content * Posts may be submitted late or contain multiple grammar and/or spelling errors * Does not respond to a classmate’s post |
| Below Expectations  40-69 % | * Discussion post does not contain enough reference back to original topic or may not address the issue at hand sufficiently * Little evidence of knowledge/understanding of course content is shown * Posts contain incomplete sentences and/or may not adhere to standard English grammar/spelling |
| Cannot Judge (Missing)  0 points | * Student did not complete discussion. |

## **Academic Integrity**

The consequences of scholastic dishonesty are very serious. You are responsible for reading and understanding our policy on academic integrity policy, available from the [Rutgers Academic Integrity website](http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers). Academic integrity means, among other things, that all Rutgers students are required to:

* properly acknowledge and cite all use of the ideas, results, or words of others
* properly acknowledge all contributors to a given piece of work
* make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of unsanctioned materials or unsanctioned collaboration
* treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress

**Code of Conduct**

Rutgers University-Camden seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community and includes classroom space. As a student at the University you are expected adhere to Student Code of Conduct. To review the<https://deanofstudents.camden.rutgers.edu/student-conduct>  Note that the conduct code specifically addresses disruptive classroom conduct, which means "engaging in behavior that substantially or repeatedly interrupts either the instructor's ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities."

## **Inclusivity**

I am committed to diversity and inclusion in this course and want to include all perspectives. Please let me know if you perceive any bias in any form in this course. I’ll be asking for your pronouns in the first module, and will ask all class members to respect the pronoun and name choices of each individual in this class.

If you have a preferred name other than what is listed on the roster, kindly let me know. If you would like to have your name changed within the rosters officially <https://deanofstudents.camden.rutgers.edu/preferred-nameapplication>

However, I understand that all students may not have the ability to have their preferred name displayed officially, and I will use the preferred name you submit informally in this course.

**Basic needs security**

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students for support.

[Rutgers–Camden Dean of Students](https://na01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdeanofstudents.camden.rutgers.edu&data=02%7C01%7CPICCOLI%40CAMDEN.RUTGERS.EDU%7C519167d1e8b740fa679208d6463f6c15%7Cb92d2b234d35447093ff69aca6632ffe%7C1%7C0%7C636773635583578514&sdata=Bwk6k4S6i112M7dGVEbB%2BQk%2BgS5K0lEdDGmcPZQ5GlM%3D&reserved=0)

Rutgers–Camden Food Pantry

**CARES**

Rutgers-Camden has a wide range of resources to help you stay on track both personally and academically. The Raptor Cares Report (https://deanofstudents.camden.rutgers.edu/reporting) connects you to our Dean of Students Office and they can assist you with a variety of concerns: medical, financial, mental health, or any life issue which impacts your academic performance. You can share a concern for yourself, a classmate or a friend.

**Disability**

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>.

If the documentation supports your request for reasonable accommodations, your campus’s disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

For further information on disability services, please refer to: <http://disabilityservices.rutgers.edu>

**Office of Military and Veterans Affairs**

The Office of Military and Veterans Affairs can assist our military and veteran students with benefits, deployment issues and much more. Please contact Fred Davis (856)225-2791 frdavis@camden.rutgers.edu.

**Title IX**

Rutgers faculty are committed to helping to create a safe learning environment for all students and for the university as a whole. If you have experienced any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, know that help and support are available. Rutgers has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. The University strongly encourages all students to report any such incidents to the University. Please be aware that all Rutgers employees (other than those designated as confidential resources such as advocates, counselors, clergy and healthcare providers as listed in Appendix A to Policy 10.3.12) are required to report information about such discrimination and harassment to the University. This means that if you tell a faculty member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty member must share that information with the University’s Title IX Coordinator. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can find a list of resources in Appendix A to University Policy 10.3.12. For more information about your options at Rutgers, please go to <http://respect.camden.rutgers.edu/>