Welcome! I look forward to working with you. This syllabus provides essential, detailed, and helpful information about this class; please read it carefully. Specifics are subject to change with prior notification. The instructor reserves the right to make changes to the syllabus as the course progresses.

COVID 19: Please, you must stay home if experiencing fever, coughing, or become aware of contact with someone with such symptoms even if that person has not been tested positive yet. If you feel unwell, you should not come to campus, and you will not be penalized for your absence. Let the instructor know that you are having problems working from home, so reasonable accommodations can be made. Please, practice social distance and wear a mask while inside the building and wash your hands frequently.

Even when this course is online, instructors are required to ensure that attendance is recorded for each in-person or synchronous class session. The primary reason for documentation of attendance is to facilitate contact tracing, so that if a student or instructor with whom you have had close contact tests positive for COVID-19, the University can contact you. Recording of attendance will also provide an opportunity for outreach from student services and academic support units to assist students should they become ill. Faculty and students agree to act in good faith and work with mutual flexibility. The expectation is that students will be honest in representing class attendance.

COURSE DESCRIPTION

Events such as the emergence of COVID19 have increased awareness about the need for understanding ecology and evolution as part of evidence-based interventions to control infectious diseases. Nowadays, molecular information, together with concepts from ecology and evolutionary biology, allows for testing of hypotheses and exploration of scenarios that otherwise could not be investigated by traditional epidemiology.

The goal of GENOMICS AND INFECTIOUS DISEASE DYNAMICS (GIDD) is to illustrate the evolutionary and ecological processes leading to the emergence and re-emergence of infectious diseases (EID). This general objective will be fulfilled by an individualized take home-exam and students’ projects.

This course does not replace classes on evolution, population genetics, disease ecology, or epidemiology. However, students could use this course to identify needs regarding their training or to obtain skills that will allow them to interact with professionals working on EID.

STUDENT LEARNING OUTCOMES

Upon successful completion of this course:
- Students will have learned a variety of approaches used to study Emerging Infectious Diseases from epidemiological, ecological, and evolutionary biology frameworks.
- Students will have an understanding of the importance of active reading.
- Students will have gained proficiency in actively discussing a scientific problem.
- Students will have gained proficiency in writing and presenting a project.
- Students will have gained proficiency in self-directed learning.

REQUIREMENTS AND COURSE PHILOSOPHY

Prerequisite Undergraduates: BIOL 2112 or 2912 – Introduction to Biology with a grade of C or better
Prerequisite Graduate Students: None.
Epidemiological and evolutionary concepts will be discussed in class. However, students (you) are responsible for checking concepts from genetics and reviewing information on your own as needed (e.g., characteristics of the HIV virus, genetic exchange in bacteria, the genetic code, etc.). Taking responsibility for your education is called "self-directed learning," and it is an essential skill in the real world.

You are expected to engage in active reading: mind wandering while reading is discouraged. You should be actively trying to extract information from a text by focusing on the main point of each paragraph. As you read, ask yourself: "what is the purpose of this paragraph?" or "what am I supposed to learn?" Taking notes is an essential part of learning. Discussing with your classmates is highly recommended.

Genetics is not a prerequisite; still, basic concepts are needed from introductory biology (allele, locus, genetic code, genotype, mutation, phenotype, recombination, etc.). Likewise, microbiology is not a prerequisite, but concepts from general biology are needed (e.g., differences between bacteria, eukaryotic parasites, and viruses).

Students will learn how to apply/integrating concepts to address problems in infectious diseases. The evaluation is highly individualized: students will be assigned a central topic for their exams and project; also, the questions in the takehome exam are usually open to more than one correct answer. Students are expected to practice how to search, synthesize, and communicate information.

Although THERE IS NO TEXTBOOK, students should have access to a general microbiology textbook to be used as references. Temple has many resources in its library. The ones listed below are a few references that were used to prepare lectures; they are available from the Temple library portal.


Electronic Databases: Temple has free access to several electronic databases. If you are not familiar with their use (PUBMED or WEB of SCIENCE), please check (https://guides.temple.edu/biology) or ask for assistance.

Canvas and Zoom: Information and activities pertinent to the class will be delivered on Canvas. Please, check for announcements, class notes, recommended readings, updates, etc. Canvas will also be used for offline discussions and as an "online office." Required readings could be posted as a courtesy. However, you should look for them using the library. Synchronous lectures will be tough via Zoom, but those will not be recorded. Students will be given timely access to the slides. Asynchronous activities will be recorded.

Students are not permitted to copy, publish, or redistribute documents, audio or video recordings of any portion of the class session to individuals who are not students in the course or academic program without the express permission of the faculty member and of any students who are recorded. Distribution without permission may be a violation of educational privacy law, known as FERPA, as well as certain copyright laws. Any recordings made by the instructor or the University of this course are the property of Temple University.

Contacting your Instructor: Email is the preferred method of contact. Please, write a concise email, always identify yourself as a student in this class. Please be courteous, use proper language, and do not attach
unnecessary files. Emails will be answered within regular hours. Questions that require long answers or privacy are better addressed in a Zoom meeting. Do not expect answers on weekends or late at night.

**Access to the Instructor (Office hours)**

**Time after class.** The instructor will remain connected for 15 minutes after class. Although you cannot expect privacy in such a setting, this time provides an excellent opportunity for general questions. **If you need extra time or privacy, please use the Online Office or make an appointment.**

**Online Office.** It is a CANVAS asynchronous discussion board. You can post a non-urgent general question to the class that may benefit everyone, **do not expect privacy.** Students can offer a different perspective on the problem or follow up. Expect an answer from the instructor in the next 24-48 hours during working hours.

**Personalized assistance.** Office hours will be conducted via Zoom. Please make your appointment by email and give the instructor at least 24-48 hours during business days to answer. Please, if appropriate, send any written material prior to the meeting.

**Lecture slides:** Lectures will be posted **AFTER** class, within 48 hours. These materials are intended to guide the flow of the lecture and to support the explanations with appropriate graphics. In this sense, they can be used as study guides. However, they are not a substitute for note-taking, reading of assigned research articles, or searching for your own sources (checking books, review articles, etc.), **i.e., they will not suffice to write your assignments, nor can they be cited as the primary source.** It is the student's responsibility to download these guides. Please, avoid asking the instructor to send them to you by email.

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**COURSE DESCRIPTION, GRADE ALLOCATION, AND POLICIES**

This course will follow a hybrid learning model that includes a blend of both asynchronous and synchronous online learning tools. The instructor will be on campus regularly, so meetings in person could be arranged but always keeping social distancing and other precautions.

**The course involves two parts.** First, there will be lectures (synchronous) where the instructor discusses basic concepts from epidemiology, ecology, and evolution. This part will be evaluated with discussions online (asynchronous) and a takehome exam (asynchronous). The second part includes an overview of specific topics followed by discussion sessions per week, where the students will present their individual projects (both synchronous and asynchronous). Students, in their projects, are expected to use and integrate concepts learned during the first part of the class. The use of molecular evolutionary biology and ecology will be emphasized; however, a basic understanding of the epidemiological context is essential.

**GRADING PERCENTAGES:** There is a total of 100 points. Your grade will be based on the following items/activities: **Exam: 30% / Discussion and individual participation: 30%. / Project/Paper: 40%**

Please notice that the instructor does not "give" grades; you earn them. The final grades will be based on a 90-80-70-60 scale. **Study/discussion groups will be set on CANVAS.**

**Numeric-To-Letter-Grade Scale: The grading policy will be strictly applied:** A: 93-100, A-: 90-92, B+: 87-89, B: 83-86, B-: 80-82, C+: 77-79, C: 73-76, C-: 70-72, D+: 65-69, D: 55-64, D-: 50-54 D-, and F: 0-49.

**COURSE ACTIVITIES AND ASSIGNMENTS:**

**YOUR CENTRAL TOPIC:** All students will be assigned a general topic on Week 2. Such a topic is a pathogen/parasite that you should research on. Notice that your takehome exam and project will be based on it. The parasite/pathogen assigned to you is one for which there is literature available; however, you can propose an alternative topic to the instructor. You should focus on learning the pathogen's basic biology, including its life cycle, genome architecture, pathology, genetic system, ecology, and evolutionary history.

Syllabus Version 4- Aug-4/2020
**BUDDY SYSTEM:** There is much that can be learned from an excellent discussion. Students (graduate and undergraduates) will be divided into groups of 3 to 4. The group is expected to support each other in the quality/clarity of their projects. Please, notice that each student project should be unique in terms of its content/subject (two students projects cannot be on the same issues; **PROJECTS ARE NOT A GROUP ASSIGNMENT**). However, as part of a group, you are expected to discuss drafts and ideas, question the logic of each other proposals, and practice/comment on presentations. This collaboration will be followed by the instructor on discussion groups set on Canvas; it will count as participation points.

Being assertive and constructive is an important part of discussing science. Notice that good individual projects will positively impact the discussion grade of those participating in that group. A group performing well could be taking into account for rounding your grade to the next level if needed. However, if a group is dysfunctional or a member decides not to participate, then there are no negative consequences to your personal grade other than missing an opportunity to improve your participation. If you want to change groups, please inform the instructor during the first 4 weeks, and you will be reassigned based on availability.

**THE TAKE-HOME EXAM** will take place in Week 6 (due on Oct 2), and it is worth 30% of the total grade. **You should answer your test using information from your assigned pathogen/parasite.** Graduate and undergraduate students will have different exams. It will include 3 to 5 open-ended questions, and all work on this exam must be entirely your own (no collaboration is allowed). A takehome exam assumes that you are invested in the material and can use this format to integrate concepts. Although you can check your notes during the exam, it requires the same amount of preparation time that a traditional test. Please note:

- The instructor must receive it by midnight on the due date.
- **ABSOLUTELY NO QUESTIONS ABOUT CONTENT DURING THE TEST AND NO EXTENSIONS.**
- Submission is by email. It is your responsibility to make sure that the instructor receives your exam.
- **No collaboration is allowed.** Showing your exam or discussing it with anybody is prohibited, including (but not limited to) the other students in the course in current or previous years.
- You may use any publicly available material such as books, lectures, research articles, etc. You should cite those sources as needed. However, you are NOT allowed to submit questions to discussion groups or any form of social media.
- If you find an answer in a book or online, cite it in your submission. Do not copy it; you should demonstrate that you understand what you are writing. **Otherwise, it will be considered plagiarism.**
- Make your submission clear and readable. Do not use a font smaller than 11 or larger than 13. Severe readability issues may be penalized by grade.
- Please, keep a copy of your exam. The instructor may revise part of your exam with you in a face to face meeting. Thus, you are expected to provide additional information on a specific answer.

**PROJECT** is worth 40% of your final grade. **YOUR PROJECT MUST ADDRESS A REAL PROBLEM (BASIC SCIENCE OR APPLIED, DOES NOT MATTER).** It will be evaluated by the logic and ideas presented, not by the importance of the issue. You can get an A working on a virus that infects, but not harms sea cucumbers, but a C proposing to work on antibiotic resistance.

On **week 9 (Oct 23), you should turn in a project pre-proposal** supported by up to 7 slides presentation. The pre-proposal aims to show the structure of the project; thus, **it is expected to be detailed and thoughtful.** It must include the tentative title, a summary paragraph (why this project is relevant), and an outline. In particular, the summary should describe the topic that you intend to write on, explain the importance of the question/concept that you will address, how you intend to approach it, and the claims you expect to make. The summary paragraph in your paper proposal should be no shorter than 400 words. The pre-proposal should be as detailed as you can, but it cannot exceed two (2) pages, please use whatever format you like. You should also add a few references. Both CANVAS and Email submissions are required.

You will present your proposal in the class before turning in your final proposal; your presentation will be part of your participation grade. Prepare your presentation in a way that you can get useful comments from your classmates. You will have only 10 minutes to present it. As a suggestion, the significance and background of
the project should not take longer than 4 minutes, use at least 6 minutes to describe what you propose to do and how the expected results will answer the issues that you want to address. When others are presenting, you will be expected to give feedback, so pay attention when your classmates are presenting their proposals.

**Final Project Format:** The font must be 11 points. The margins (top, bottom, left, and right) should be at least 1/2 inch. All text should be written in a single space.

**Page 1: A title (200 characters Max),** it should be followed by the Student Name, and email address. The project summary should follow. Also, on page 1 is the **Project summary;** it provides a brief background of the project, its specific aims, objectives, hypotheses, expected results, and overall importance. The project summary should not be longer than 35 lines, and it does not include references.

**Page 2 (limit one page):** Background/Statement: describing the Problem/SIGNIFICANCE of the Project/Research Question. Convince the reader that this project is worth doing. The project is expected to stress the role played by interpreting molecular data using evolutionary/ecological concepts in understanding the dynamics of an infectious disease. Why does this specific project matter? What is the larger problem that this particular project will contribute to addressing? How will this project impact our understanding of the larger problem? What is the premise of your proposal (E.g., by sequence the genomes of X viruses from samples collected, we will gain knowledge of...). Spell out the specific aims of your project and the hypotheses that you plan to test with each aim (Usually projects have between 2 and 3 aims). You should cite specific references here; follow any format that you like as far it is a standard, and it is used consistently throughout the text.

**Page 3-4 (graduate students) Preliminary data:** Graduate students should present a preliminary analysis in 1 to 2 pages showing how they will address the question that they like to investigate. Typical sources of data are the genebank and other databases. The data sources should be real and described in this section. **Undergraduate students are not required to present preliminary data analysis.**

**Approach/Project Design, 2 pages (all students).** You should include a method of inquiry to work through the specific aims outlined on page 2. Describe the samples, methods, and concepts that you like to use. Justify the proposed methodology by focusing on how you expect that the data will answer the questions sets in your hypotheses. Discuss potential problems (your study may fail), describe inherent limitations, and how you plan to mitigate those. Do not consider restrictions in terms of funding or access to places or samples (e.g., do not exclude a method or samples because it is expensive); focus on being rigorous in terms of the problem and how the data will answer the hypotheses. You cannot make up technologies, but you do not need to describe techniques in detail either, provide a brief rationale and a reference that explains the methodology. Importantly, explain how the expected results will contribute to solving the aims/hypothesis proposed. Tables and diagrams are allowed within the two pages; you cannot add additional pages because a table or a graph is needed.

References pages (Only those cited), there is no limit on the number of pages for references. Notice that you need to use a format (any standard format), and it should be used consistently across the text.

**Read This, Extremely Important:** You are expected to integrate concepts in your project, so your effort for integrating at least two of the three major areas (ecology, evolution, and epidemiology) will account for 50% of your grade. Projects focusing only on epidemiology, clinical aspects (pathology), public health, immunology, or conservation medicine (even well-written essays) will not get a good grade. There are no makeup projects without a valid medical excuse.

**Overall Recommendation.** Brevity and Standard English are characteristics of scientific writing. Please avoid using unnecessary adjectives, flowery language, or redundancy. Avoid teleological arguments* (e.g., the pathogen benefits by making us sick); it will harm your grade. Avoid anthropomorphism (e.g., the bacteria decides when to infect); it will hurt your grade. **The colloquial use of terms will not be accepted.** Literal quotations from papers are not recommended; if you need to use quotes, please identify the source and identify the quote since those words will not be considered in for the paper total length.

**Attendance:** Attendance is required. Any excused absence (e.g., medical excuses) should be notified to the instructor before the day or within three business days after you missed your class (if possible). Students who wish or need to request more than two excused absences should talk with the instructor. Students with more than four unexcused absences will get no more than a "C-" even if they turn their exam and paper in. You cannot have 100% participation by missing lectures regularly. Please, be aware that zoom records everything, including chats, even between students, so be professional and do not write anything that you do not wish the instructor to read. The instructor will notify the class if a lecture is going to be recorded.

**Discussion and Individual Participation (30% Total Grade):** You are expected to be an active participant. You do not have to memorize readings; please use your notes and any material that can enrich a discussion. Let us define "participation" as: a) comments/questions showing that you have understood an issue, b) a reasonable attempt to understand or highlight a problem, c) provide an alternative perspective, d) the presentation of your project, and e) the success of your classmate (buddy system). The instructor will keep a record of your participation; it will include your discussions in CANVAS groups. You are welcome to check your participation record with the instructor. Students that participate below average cannot expect a good grade. If you believe that you are not performing well in the discussion, please contact the instructor.

A reasonable effort invested in understanding a problem is highly appreciated even when the arguments are not entirely correct. **However, being lost or openly guessing is not considered participation.** Students are expected to do their best and been actively engaged in the discussion. Everyone could have a bad day; there will be plenty of opportunities to participate and recover. As a benchmark, a student that participates below average cannot expect more than 50% of the participation points.

**Extra Credit Policy:** Extra credits are never given to satisfy individual needs. If the instructor decides to organize activities in which additional credits can be earned, all students will have the same opportunity.

**Late Assignments:** It is anything that is turned in after a dateline without medical excuse or previous authorization from the instructor. If the instructor decides to grade it, 25% will be taken off the final grade if received up to 24 hours late. After a day and up to 72 hours, your grade will be penalized up to 50% off. No late assignment will be accepted after 72 hours. **It is up to the instructor to grade a late assignment.**

**Revising Your Grade (Regrade):** Revisions should be requested by email within two business days after the grade is posted. A revision is any disagreement different from adding points. A student cannot request a revision of only part of the assignment (e.g., a single paragraph out of context). As part of the revision, your grade is nullified, so your revised grade can go up, down, or remain unchanged. A revision is a dynamic process. Been self-critical is essential; you will present your case, and it will be part of the revision process. Notice that "I put a lot of effort" is not a valid argument, focus on the quality of your work. Having said so, if there were mitigating circumstances that you believe should be considered, please come forward. Revised grades cannot be appealed to the instructor, but there is a process that you can follow.

"**Borderline** Grades Policy:** Students should not expect to be "bumped up" automatically to the next letter grade. **It is unethical to ask for a grade that you have not earned (even by a fraction), you will automatically lose that "extra point" if you request it from the instructor.** The instructor will evaluate all the borderline cases before posting the final grades and then decide whether a student could receive that extra point considering the big picture (overall responsibility project, participation, improvement, etc.).

**Internet or Computer Problems: Technology Specifications for this Course**
Limited resources are available for students who do not have the technology they need for class. Students with educational technology needs, including no computer or camera or insufficient Wifi-access, should submit a request outlining their needs using the Student Emergency Aid Fund form. The University will endeavor to meet needs, such as with a long-term loan of a laptop or Mifi device, a refurbished computer, or subsidized internet access. Please consider the possibility of having a last-minute problem.

**VIRTUAL CLASSROOM RULES OF CONDUCT:**
1. Please connect to the class on time and plan to stay for the entire lecture/discussion.
2. Remember that a video conference has the same degree of respect as a live class. Turn your webcam on and consider your appearance. The less seriously you take the video conference, the harder it will be to learn and participate in the class.
3. While in discussion groups, be aware of the language you use; avoid all caps text and exclamation points. It is easy for written text to be misunderstood. Your written communication should be professional.
4. All cell phones must be turned off and hidden from view during class time. If you are expecting an important call, please notify the instructor before class. You should keep the phone on vibrate and answer the call with both your mic and the video turned off. The zoom chat will be inactivated during lectures. However, when open for discussion, remember, ZOOM RECORDS CHATS, even if a message is not directed to the instructor or the class.
5. Use headphones with a mic. It is easier for the class to hear from you when you need to talk. Also, headphones will help you block out the distractions around you.
6. Activities such as checking personal email or browsing the Internet are **DISCOURAGED**.

**DISABILITY DISCLOSURE:** If you have not done so already, please contact Disability Resources and Services (DRS) at 215-204-1280 in 100 Ritter Annex to learn more about the resources available to you. The instructor will work with DRS to coordinate reasonable accommodations for all students with documented disabilities. Any student who needs accommodation should contact the instructor privately to discuss specific requirements by the end of the second week of classes or as soon as possible. If there are circumstances that make our learning environment difficult, please contact the instructor. Notice that request assistance timely is essential; please avoid unnecessary stress.

**STUDENT/FACULTY ACADEMIC RIGHTS AND RESPONSIBILITIES:** The University has a policy on Student and Faculty Academic Rights and Responsibilities which can be accessed through the following link: https://www.temple.edu/secretary/sites/secretary/files/policies/03.70.02.pdf

**ACADEMIC DISHONESTY, INCLUDING INAPPROPRIATE COLLABORATION, WILL NOT BE TOLERATED.**
**STUDENT CODE OF CONDUCT (SoC):** Violations of the SoC include, but are not limited to academic dishonesty and impropriety, including plagiarism and academic cheating; interfering or attempting to interfere with or disrupting the conduct of classes or any other normal or regular activities of the University (see: https://www.temple.edu/secretary/sites/secretary/files/policies/03.70.12.pdf).

**LETTERS OF RECOMMENDATION:** You want a recommender that can write something more than "The student demonstrated excellent knowledge of the subject, with a grade of "A" in my class." Therefore, I will decline to write you a recommendation letter that is based solely on this class.
# PROGRAM

The instructor reserves the right to modify, supplement, and make changes to this syllabus as the course progresses. Thus, specifics are subject to change with prior notification.

<table>
<thead>
<tr>
<th>Dates:</th>
<th>Topics</th>
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<tr>
<td><strong>Week 1 (8/25-8/27):</strong></td>
<td>CHECK THE SYLLABUS AND THE LINKED PRESENTATION BEFORE COMING TO CLASS.</td>
</tr>
<tr>
<td>L1:</td>
<td>Introduction. Epidemiology of infectious diseases: Basic concepts: Population, Case Definition, Research Methods/Study Design</td>
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<th><strong>Week 2 (9/1-9/3):</strong></th>
<th>A TOPIC WILL BE ASSIGNED BY THE INSTRUCTOR.</th>
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<tbody>
<tr>
<td>L4:</td>
<td>From Epidemiology to Ecology: Introduction to Evolutionary Ecology of pathogens. R₀ and defining a population.</td>
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<th><strong>Week 3 (9/8-9/10):</strong></th>
<th>CASE DISCUSSION WILL BE POSTED (CANVAS)</th>
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<tbody>
<tr>
<td>L5:</td>
<td>Transmission Dynamics - How to read a SIR model (an Introduction)</td>
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<tr>
<td>L6:</td>
<td>Evolution: Natural Selection: Fitness, Red Queen Hypothesis, Arms Race, Virulence, and other models.</td>
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<tr>
<th><strong>Week 4 (9/15-9/17):</strong></th>
<th>L7: Genetic drift and Neutral Theory of Molecular Evolution.</th>
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<td>various authors</td>
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<th><strong>Week 5 (9/22-9/24):</strong></th>
<th>L8: Evolution: Genetic Variation and Population Structure</th>
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<tr>
<td>L10:</td>
<td>Basics on how to read phylogenetic trees.</td>
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Week 6 (9/29-10/1):
L11: Basics on how to read phylogenetic trees.

D1: Review of Phylogenetic methods.

TAKE-HOME EXAM WILL BE POSTED 09/25/2019, DUE ON 10/02/2019 AT MIDNIGHT

Week 7 (10/6-10/8):
D2: Review of Phylogenetic methods.


Week 8: (10/13-10/15):
UNDERGRADUATE MIDTERM PROGRESS DUE ON OCT 12
D4: One Health.

D5: One Health.

Week 9 (10/20-10/22): D6: Evolutionary Epidemiology.

10/22 Discussion Students Projects.

YOUR SLIDE PRESENTATION AND PREPROPOSAL ARE DUE ON 10/26

Week 10: (10/27-10/29) Discussion Students Projects

Week 11: (11/3-11/5) Discussion Students Projects

Week 12: (11/10-11/12) Discussion Students Projects

Week 13: (11/17-11/19) Discussion Students Projects

FALL BREAK

Week 14: (12/1-12/3) The instructor will be available for discussing projects, discussion groups will be open. There could be additional activities.

FINAL PROPOSAL IS DUE ON (12/8)