Instructors: Armin R. Mikler  
Lectures: MW 3:30 – 4:50 pm in NTDP B157  
Office Hours: MW 9:30 – 11:00  
Phone: 565-4279  
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Textbook: An Introduction to Epidemiology” by Thomas C. Timmerick, selection of current journal papers and reports

Course Objective: As part of the specialization in Computational Life Science, this course will focus on the application of computational methods to problems in the field of Epidemiology and Public Health. After a survey of different types of problems from the domain of public health, and current methodologies for addressing these problems, this course will explore a variety of computation science paradigms that are deemed suitable to support epidemiological research. Specifically, this course will be structured as follows:

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>Week #</th>
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<tbody>
<tr>
<td>Introduction to Public Health and Epidemiology</td>
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<tr>
<td>a. History of Public Health and Epidemiology</td>
<td>1</td>
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<tr>
<td>b. Fundamentals of Disease Transmission</td>
<td>2</td>
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<td>c. Disease and Population</td>
<td>3</td>
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<td>d. Properties of different classes of diseases:</td>
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<tr>
<td>i. Airborne infectious diseases and their transmission (Influenza)</td>
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<tr>
<td>ii. Vectorborne diseases and transmission (Malaria, West-Nile)</td>
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<td>iii. Waterborne diseases and their transmission (Cholera)</td>
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<tr>
<td>iv. Sexually transmitted diseases (HPV, HIV)</td>
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<tr>
<td>v. Chronic diseases (Cancer)</td>
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<td>e. The role of social contacts and individual behavior in disease transmission.</td>
<td>6</td>
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<tr>
<td>f. Bioterrorism</td>
<td>7</td>
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<tr>
<td>Computational Paradigms and their role in Public Health</td>
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<tr>
<td>g. Probabilistic Models</td>
<td>8</td>
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<tr>
<td>h. Dynamic Modeling with Difference Equations</td>
<td>9</td>
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<tr>
<td>i. Modeling and Simulation of Infectious Diseases</td>
<td>10</td>
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<tr>
<td>ii. Agent-Based Models</td>
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<td>iii. Contact Models</td>
<td>11</td>
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<td>iv. Cellular Automata</td>
<td>11</td>
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<tr>
<td>j. Experimental and Investigative Methods in Epidemiology</td>
<td>12</td>
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<tr>
<td>k. Simulation Techniques</td>
<td>13</td>
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<tr>
<td>l. The role of Distributed and High Performance Computing in Public Health</td>
<td>14</td>
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**Course Outcomes:** CSCE/BIOL 4820 Computational Epidemiology

1. Understand the interdisciplinary nature of Computational Epidemiology
2. Understand the principles of Epidemiology and its challenges to identify the cause of outbreaks
3. Understand the fundamentals of mathematical outbreak models and their interpretation
4. Understand the basics of computational modeling and simulation
5. Learn the fundamentals study designs in epidemiology
6. Understand the difficulties of communicating among researchers in an interdisciplinary setting.
7. Learn to present Public Health related information and study results.

**Grading:**

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Assignments (x)</td>
<td>20%</td>
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<tr>
<td>Semester project (1)</td>
<td>20%</td>
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<tr>
<td>Midterm (1)</td>
<td>20% (take home exam)</td>
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<tr>
<td>In Class Presentation (1)</td>
<td>20%</td>
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<tr>
<td>Final project presentation (1)</td>
<td>20%</td>
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**Submission:** All submissions, including assignments, projects and exams, shall be turned in electronically using the project command. Late submissions will not be accepted.

**Graduate vs. Undergraduate Work:** Since this is a combined course, *graduate* students will be assigned some additional assignments and projects as appropriate.

**Attendance:** Attendance will not be taken in class, but is expected. However, all students are responsible for everything done or said in class.

**Guest Speakers:** There will be 2-3 presentations by invited speakers. These guest lectures will cover the corresponding course contents. The specific dates for guest lectures will depend on their availability and will be announced in advance.

**Plagiarism:** Plagiarism of any kind will automatically result in a grade of F for the course.

**Americans with Disabilities Act:** We cooperate with the Office of Disability Accommodation to make reasonable accommodations for qualified students (cf. Americans with Disabilities Act and Section 504, Rehabilitation Act) with disabilities. If you have not registered with ODA, we encourage you to do so. If you have a disability for which you require accommodation please discuss your needs with the instructor or submit a written Accommodation Request on or before the fourth class day.

**Note:** This course will be open for graduate students in Computer Science, Biology, Geography, and UNT Health Science Students who pursue degrees in Epidemiology or Biostatistics, and related fields.