

**BMI 199**  
**What is Biomedical Informatics?**  
**Registration Number 23350**  
**UB Seminar - 3 credits**  
**Fall 2020**

**COURSE INFORMATION:**

Lecture: Thursday 9:35-10:50 AM  
 Remote, real-time: Students are considered in attendance when they log-in to the virtual classroom platform on time with their camera on, unless otherwise instructed. Webcams should be at eye level and students should refrain from multi-tasking while in class.

Recitation: Tuesday 9:35-10:50 AM  
 Remote, real-time: Students are considered in attendance when they log-in to the virtual classroom platform on time with their camera on, unless otherwise instructed. Webcams should be at eye level and students should refrain from multi-tasking while in class.

Course Coordinator: Shannon M. Brown- Academic Advisor  
 Contact: [smbrown3@buffalo.edu](mailto:smbrown3@buffalo.edu)  
 716-829-5451

Instructors: Shannon M. Brown  
 Dr. Werner Ceusters Contact: [ceusters@buffalo.edu](mailto:ceusters@buffalo.edu)

**COURSE DESCRIPTION:**

Students will engage with topics illustrating the impact of recent advances in information technology in general and biomedical informatics in particular on health and well-being. The topics discussed will be based on real life stories and current events, this year primarily the Covid-19 pandemic, and will encompass aspects and consequences thereof encountered in everyday life either by individuals or members of a larger community. Examples are the use of wearable devices; access of one’s medical data through patient portals; artificial intelligence for early diagnosis of medical conditions, drug discovery, virtual and augmented reality, as well as early detection of disease outbreaks; impact of social media on life style and health living, etc. Each topic will be discussed in light of observed benefits and drawbacks for individuals and society and the extent to which they lead to or are brought about by opposing forces: increased availability of information versus disinformation and privacy violations, broad societal availability versus disparities, cultural factors in adoption or rejection of biomedical technologies.

Students will learn how to review and discuss articles from a scientific point of view and look at biomedical informatics and technology related topics from a variety of perspectives: as user, developer, social activist, policy maker, health professional, and so forth.

After the general introductory classes, each seminar class will consist of a lecture part on Thursday followed by a recitation part the next week on Tuesday. This will allow students to address the assignments related to the lecture and present the results for further group discussions during the recitation.

**STUDENT LEARNING OUTCOMES:**

Having completed a UB Seminar, students will be able to:

Student Learning Outcomes (SLO)	Student Achievement of This Learning Outcome will be Assessed by:
1. Think critically using multiple modes of inquiry.	Discussion and written assignments
2. Analyze disciplinary content to identify contexts, learn fresh perspectives, and debate and discuss problems in the field.	Participation in discussion; quality of thought in written assignments.
3. Understand and apply the methods of close reading, note taking, analysis, and synthesis.	Successful completion of in class and homework assignments both written and oral.
4. Recognize and debate ethical issues and academic integrity in a variety of settings.	Participation in class discussion
5. Demonstrate proficiency in oral discourse and written communication.	Successful completion of in class and homework assignments both written and oral.
6. Develop essential research and study skills such as time management.	Class discussion and completion of time management assignment with written reflection
7. Use an ePortfolio for at least one assignment.	Time Management assignment

Student Learning Outcomes (SLO)	Student Achievement of This Learning Outcome will be Assessed by:
8. Understand the academic expectations pertaining to student at the University at Buffalo and to higher learning at a research university.	All written assignments and class discussion

### COURSE MATERIALS:

#### Assigned readings:

- R1. Bernstam EV, Smith JW, Johnson TR. What is biomedical informatics? J Biomed Inform. 2010 Feb;43(1):104-10. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2814957/>
- R2. Ye, J., The Role of Health Technology and Informatics in a Global Public Health Emergency: Practices and Implications From the COVID-19 Pandemic. JMIR Med Inform, 2020. 8(7): p. e19866. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7388036/>
- R3. Scheuermann R, Ceusters W, Smith B. Toward an Ontological Treatment of Disease and Diagnosis. 2009 AMIA Summit on Translational Bioinformatics, San Francisco, California, March 15-17, 2009;: 116-120. Omnipress ISBN:0-9647743-7-2 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3041577/>
- R4. Lipsitch, M., D.L. Swerdlow, and L. Finelli, Defining the Epidemiology of Covid-19 - Studies Needed. N Engl J Med, 2020. 382(13): p. 1194-1196. <https://www.nejm.org/doi/pdf/10.1056/NEJMp2002125?articleTools=true>
- R5. Cimino, J.J., Desiderata for controlled medical vocabularies in the twenty-first century. Methods Inf Med, 1998. 37(4-5): p. 394-403. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3415631/>
- R6. Lees-Haley P.R. More propaganda techniques. In: Quackwatch, Your Guide to Quackery, Health Fraud, and Intelligent Decisions. 1997. <https://quackwatch.org/related/propa/>
- R7. Tasnim, S., M.M. Hossain, and H. Mazumder, Impact of Rumors and Misinformation on COVID-19 in Social Media. J Prev Med Public Health, 2020. 53(3): p. 171-174. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7280809/>
- R8. Gusterson H. Will U.S. university students spread Covid-19? Sapiens, 20 July 2020. <https://www.sapiens.org/column/conflicted/will-u-s-university-students-spread-covid-19/>
- R9. Wu, G., et al., Development of a clinical decision support system for severity risk prediction and triage of COVID-19 patients at hospital admission: an international multicentre study. Eur Respir J, 2020. 56(2). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7331655/>
- R10. Morris A. Monitoring COVID-19 from hospital to home: First wearable device continuously tracks key symptoms. Northwestern Now. 4 May 2020. <https://news.northwestern.edu/stories/2020/04/monitoring-covid-19-from-hospital-to-home-first-wearable-device-continuously-tracks-key-symptoms/>

### COURSE REQUIREMENTS:

- Students must attend and participate in class discussions. Excused absences are limited to school sanctioned event or religious observation. Medical absence must be accompanied by a doctor's note. Learning outcomes: 8
- Students must logon in time. Cameras must be one, and clearly show faces. Adjust lighting conditions of the room when needed. Microphones must be muted at login time. When the instructor asks a question, students wishing – or asked – to respond must unmute, and mute once ordered to do so.
- All assignments (A1–A12), must be completed on time. Late or make-up assignments will not be accepted. Learning outcome: 6.
- Students will complete in some classes a quiz (Q1-Q3) based on that week's topic, which will serve as students' lecture attendance grade. For classes with no quiz, attendance will be assessed through timely login on the on-line conference call. Learning outcomes 8
- Class Discussion: Each student will be able to provide analysis and reflection on assigned articles for use during the class discussions; learning outcomes 1,2,3,5,
- Complete time management log with reflection. Students will select week in the first month and a half of the semester. They will complete a weekly log on; time spent studying, class time, etc. for that week and turn it in with a reflection on how they managed their time, what they would change and what tactics they employed or wish they had used. The final assignment will be uploaded to UBLearn. Learning outcome 6
- Final Assignment: Write a brief reflection (personal statement) on how you have changed in your first semester at UB. Students will reflect on their academic and personal growth as well as goals for the rest of their time at UB. The final assignment will be uploaded to UBLearn. Learning outcome 7,8

- Students will be responsible for three quizzes throughout the semester.
- Students are required to complete 1 exam during exam week.
- Student will have assignments related to the readings assigned. Details on those assignments (Labeled A1-A4) can be found below. The deadline for assignments A1-A12 is specified in the Academic Content section. Learning outcomes 1,2,3,5,6

**ACADEMIC CONTENT:**

<b>Date</b>	<b>Topics</b>	<b>After-class assignments</b>	<b>SLO</b>
<b>C1 Tuesday Sept 1</b>	<ul style="list-style-type: none"> <li>• General introduction to the course.</li> <li>• Review of UBLearns</li> <li>• Discussion on expectations. High School V. College</li> <li>• UB Curriculum Requirements</li> <li>• Time management</li> <li>• Personal statement</li> </ul>	<p>Students will review the academic integrity policy of the university.</p> <p><b>A1.</b> Time management log and reflection (due Oct.6th) Upload to UBLearns  <b>A2.</b> Personal statement due Dec.8<sup>th</sup> Upload to UBLearns</p>	4,6,8
<b>C2 Thursday Sept 3</b>	<p>Students will discuss the meaning of academic integrity. Students will be broken into small groups and asked to review scenarios in which students violated the policy. They will be tasked with formulating alternative actions that do not violate the policy. Students will engage in a large group discussion relating academic integrity to larger ethical issues (specifically in medicine).</p>	<p>Install prior to <b>C3</b> the following software on your laptop if you don't have it yet:</p> <ul style="list-style-type: none"> <li>• Microsoft Office (at least Word and Excel):  <a href="http://www.buffalo.edu/ubit/service-guides/software/downloading/windows-software/managing-your-software/office-2019.html">http://www.buffalo.edu/ubit/service-guides/software/downloading/windows-software/managing-your-software/office-2019.html</a></li> <li>• Endnote: <a href="https://library.buffalo.edu/endnote/">https://library.buffalo.edu/endnote/</a></li> </ul> <p>If you are using a Mac, download appropriate software that is compatible with Office. If you have a netbook, you might use Google docs, but you will miss out on certain important features.</p>	4, 6, 8
<b>C3 Tuesday Sept 8</b>	<p>Introduction to use of Excel, Word and Endnote. Guided exercise.</p>	<p>Read paper <b>R1</b> prior to <b>C4</b>.</p>	6
<b>C4 Thursday Sept 10</b>	<ul style="list-style-type: none"> <li>• <b>Q1:</b> In-class 2-question quiz on paper <b>R1</b>.</li> <li>• Lecture: biomedical Informatics as a discipline: technologies and applications</li> </ul>		2, 6
<b>C5 Tuesday Sept 15</b>	<p>Guided exercises on the use of Pubmed, Google Scholar and UB library resources.</p>	<p>Read paper <b>R2</b> prior to <b>C6</b></p>	1, 2, 6
<b>C6 Thursday Sept 17</b>	<ul style="list-style-type: none"> <li>• <b>Q2:</b> In-class 2-question quiz on paper <b>R2</b>.</li> <li>• Lecture: How to distinguish science from pseudoscience, and opinions from arguments?</li> </ul>	<p><b>A3.</b> Apply to paper <b>R2</b> the principles and criteria for scientific research and reporting as explained in lecture <b>C6</b>. Write a short report of exactly 1 page (Times New Roman 10 points, margins 1 inch, single line spacing) on the extent to which this paper exhibits the desired criteria. State for each criterion whether the paper does or does not satisfy it, and give a succinct argument for why that is.            Email your Word-document to wceusters@gmail not later than Monday Sept 21 – 9AM.</p>	1,3,4,5,6
<b>C7 Tuesday Sept 22</b>	<p>Presentation and discussion of <b>C6</b> assignment</p>	<p>Read paper <b>R3</b> prior to <b>C8</b></p>	2, 5
<b>C8 Thursday Sept 24</b>	<p>Lecture: Disorder, disease, illness, sickness: is there a difference?            Introduction to biomedical ontology.</p>	<p><b>A4.</b> Read the CDC webpage with title 'Coronavirus Disease 2019 (COVID-19) 2020 Interim Case Definition, Approved April 5, 2020' (<a href="https://wwwn.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/">https://wwwn.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/</a>). Classify ten biomedical terms used in the criteria section of the webpage according to the definitions provided in <b>R3</b> and in lecture <b>C8</b>.            Email your Word-document to wceusters@gmail not later than Monday Sept 28 – 9AM.</p>	1,2,6

<b>C9</b> <b>Tuesday</b> <b>Sept 29</b>	Presentation and discussion of <b>C8</b> assignment. Demonstration: computing similarity of student responses.	Read paper <b>R4</b> prior to <b>C10</b>	1,2,3
<b>C10</b> <b>Thursday</b> <b>Oct 1</b>	Lecture on key epidemiological notions: incidence, prevalence, risk, morbidity, mortality, ...	<b>A5.</b> Students will visit <a href="https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html">https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html</a> for three consecutive days, write down for the US and for three individual states (each one of which must have a different color code than the two other ones on the first day) the total and new cases for these days. They will compute and interpret the statistics explained in class <b>C10</b> . Email the Excel-document to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Monday Oct 5 – 9AM.	1,2,6
<b>C11</b> <b>Tuesday</b> <b>Oct 6</b>	Discussion of <b>C10</b> assignment. Selected students will present their work.		2
<b>C12</b> <b>Thursday</b> <b>Oct 8</b>	Lecture: clarity in biomedical language I, followed by guided demonstration of SNOMED CT.	<b>A6.</b> After class, students will organize themselves to form four groups. Each group will collaborate on-line to perform a different and focused analysis on the presence of covid 19 terms in SNOMED CT ( <a href="https://browser.ihtsdotools.org/?perspective=full&amp;conceptId1=404684003&amp;edition=MAIN/2020-07-31&amp;release=&amp;languages=en">https://browser.ihtsdotools.org/?perspective=full&amp;conceptId1=404684003&amp;edition=MAIN/2020-07-31&amp;release=&amp;languages=en</a> ) following instructions provided in <b>C12</b> . Each group will send its results, thereby clearly identifying the students who participated and who will present in class, in a Word-document to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Oct 12 – 9AM.	1,2,3
<b>C13</b> <b>Tuesday</b> <b>Oct 13</b>	Presentation of group works. Discussion of <b>C12</b> assignment	Read paper <b>R5</b> prior to <b>C14</b>	1, 2
<b>C14</b> <b>Thursday</b> <b>Oct 15</b>	Lecture: clarity in biomedical language II, followed by guided demonstration of the International Classification of Diseases.	<b>A7.</b> Students will be given the hierarchical structure of a small ICD-10-CM category obtained from two distinct versions in time. They need to describe the changes and assess the consequences thereof in terms of the quality criteria described in <b>R5</b> . Results must be sent in a Word-document to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Oct 19 – 9AM.	1, 3
<b>C15</b> <b>Tuesday</b> <b>Oct 20</b>	Discussion of <b>C14</b> assignment	Read paper <b>R6</b> prior to <b>C16</b>	1,4,5,6
<b>C16</b> <b>Thursday</b> <b>Oct 22</b>	<b>Q3:</b> In-class 2-question quiz. Lecture: Fallacies in argumentation	<b>A8.</b> Read paper <b>R7</b> . Find in the paper five examples, each one of a different fallacy, discussed in class. List the examples using appropriate Endnote references, indicate the type of fallacy, and explain why you believe the example being of the designated type. Results must be sent in a Word-document to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Oct 19 – 9AM.	1
<b>C17</b> <b>Tuesday</b> <b>Oct 27</b>	Discussion of <b>C16</b> assignment. Developing a DELPHI approach for a global student assessment of paper <b>R7</b>		1,3,4,5,6
<b>C18</b> <b>Thursday</b> <b>Oct 29</b>	Lecture: informatics tools to detect outbreaks and track disease	Read paper <b>R8</b> prior to class <b>C17</b>	1,2,3,6
<b>C19</b> <b>Tuesday</b> <b>Nov 3</b>	On-line forum discussion on how the tools discussed in <b>C18</b> might be used to confirm or challenge claims and opinions expressed in reading <b>R8</b> .		1,2,3,6
<b>C20</b> <b>Thursday</b> <b>Nov 5</b>	Lecture: basic evaluation techniques for artificial intelligence (specificity, precision, PPV, NPV)	<b>A9.</b> Read paper <b>R9</b> prior to <b>C21</b> . Select 2 features from Table 1 and two from Table 2 which you believe would give a good model for predicting severity. Explain why you picked these. Do	3

		the same for 2 features from each table that would produce a bad model. Use Excel to compute for each model the specificity, precision, PPV and NPV. Compare the results of both models with each other and with your expectations and try to give an explanation for anything unexpected. Send your Excel-file with computations and explanations to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Nov 9 – 9AM.	
<b>C21 Tuesday Nov 10</b>	Selected students will present their models. Other students will express their beliefs in the adequacy of the choice. Results will be discussed.		1,2,3,6
<b>C22 Thursday Nov 12</b>	Lecture: wearable devices and the Internet of Things	<b>A10.</b> Read article <b>R10</b> . Several claims are made about what you could do with the device. Pick one claim and use what you have learned from previous lectures to propose what concretely needs to be done to prove or disprove the claim. Send your concrete ideas in a Word doc to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Nov 16 – 9AM.	1,2,5
<b>C23 Tuesday Nov 17</b>	Selected students will present their proposals on how to verify a claim. Others discuss the feasibility and likelihood for the proposal to do what is intended to do.		1,2,3,6
<b>C24 Thursday Nov 19</b>	Lecture: What makes a chemical compound a medicinal drug? Why are (some) drugs so expensive?	<b>A11.</b> Access <a href="https://www.pharmacychecker.com/drug-price-comparisons.asp">https://www.pharmacychecker.com/drug-price-comparisons.asp</a> . Students must perform enough searches on drugs, thereby playing with different drugs, quantities and zip-codes, to be able to detect what pricing policies are used by distinct pharmacies and to provide arguments what factors for price setting seem to be used within specific brands of pharmacies. Findings must be documented and discussed in an Excel spreadsheet. Send your work by email to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than Nov 23 – 9AM.	2,3,5
<b>C25 Tuesday Nov 24</b>	Selected students will present their work. Others discuss.	<b>A12.</b> Access <a href="https://buffalowater.org/Quality/WaterQualityReports/">https://buffalowater.org/Quality/WaterQualityReports/</a> . From the reports available, accumulate the information on at least five detected non-organic contaminants in a spreadsheet and produce graphs showing the changes in concentration levels of these contaminants over the past 20 years. Report on problems encountered with respect to information gathering, extraction, reformatting and interpretation. Send your work by email to <a href="mailto:wceusters@gmail.com">wceusters@gmail.com</a> not later than	1,2,3,6
<b>Thursday Nov 26</b>	NO CLASS		
<b>C26 Tuesday Dec 1</b>	Selected students will present their work. Others discuss.		1,3,5
<b>C27 Thursday Dec 3</b>	Lecture: Is there a job market for biomedical informaticists?	Students will review this course and the results on their assignments and will make a list of topics and questions they would like to see further explained in <b>C28</b> .	1,6
<b>C28 Tuesday Dec 8</b>	Filling in the gaps: instructor will address questions from students.		3
<b>C29 Thursday Dec 10</b>	Course wrap-up and preparation for final exam.		7,8
<b>Tuesday Dec 15</b>	FINAL EXAM		

**COURSE ACTIVITIES**

- *Directed Readings*
- *Time Management log*
- *Oral presentations*
- *E-portfolio assignment- personal statement*

**GRADING POLICY:**

Learning assessments will be graded based on rubric criteria and weighted according to the following break-down.

<b>Weighting</b>	<b>Assessment / Assignment</b>
20%	Participation in class discussions
40%	Assignments
6%	Quizzes (Q1-Q3)
5%	Time management log
15%	Personal statement
14%	Final exam
100%	

**Final Grades:**

Grade	Quality Points	Percentage (EXAMPLE)
A	4.0	93.0% -100.00%
A-	3.67	90.0% - 92.9%
B+	3.33	87.0% - 89.9%
B	3.00	83.0% - 86.9%
B-	2.67	80.0% - 82.9%
C+	2.33	77.0% - 79.9%
C	2.00	73.0% - 76.9%
C-	1.67	70.0% - 72.9%
D+	1.33	67.0% - 69.9%
D	1.00	60.0% - 66.9%
F	0	59.9 or below

**ACADEMIC INTEGRITY:**

Students must be familiar with and abide by the University's policies and procedures on Academic Integrity, available at the following link: *Academic Integrity:* <https://catalog.buffalo.edu/policies/integrity.html>

**ACCESSIBILITY RESOURCES:**

Accessibility Resources coordinates reasonable accommodations for equitable access to UB for students with disabilities. Visit 60 Capen Hall, North Campus, call (716) 645-2608, or email at [stu-accessibility@buffalo.edu](mailto:stu-accessibility@buffalo.edu). Additional information is located at the Office's website: <https://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html>

**AVAILABLE RESOURCES ON SEXUAL ASSAULT:**

UB is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. You may call UB's Office of Equity, Diversity and Inclusion at (716) 645-2266 for more information. <https://www.buffalo.edu/equity.html>

**COUNSELING SERVICES:**

As a student you may experience a range of issues that can cause barriers to learning or reduce your ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns, or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other concerns. You learn can more about these programs and services by contacting:

Counseling Services: 120 Richmond Quad (North Campus), phone 716-645-2720

202 Michael Hall (South Campus), phone: 716-829-5800

Health Services: Michael Hall (South Campus), phone: 716- 829-3316

Health Promotion: 114 Student Union (North Campus), phone: 716- 645-2837

**CONTROLLED ENROLLMENT COURSES:**

The UB Seminar is a Controlled Enrollment Course [CEC]. Enrollment in a CEC is restricted by the available student positions, and self-registration for a CEC in any fall or spring semesters is available only to students taking that course for the first time. Repeat enrollment may be difficult or impossible in a fall or spring semester; a student seeking to repeat a CEC should plan to register for and do this in a UB summer session. Repeat enrollment is enrollment by a student who previously enrolled in the course at UB or transferred an equivalent course to UB and for which course the student has a grade of 'A', 'B', 'C', 'D', 'F' or qualified value thereof [e.g., 'A-', 'D+'], or a grade of 'P', 'S', 'U', 'I', 'J', 'N', or 'R'. A student may self-register to repeat a CEC in a fall or spring term only if the student's grade of record for the previous enrollment is 'W', i.e., administrative withdrawal. Students may petition for enrollment in such a designated spring course by the third week of the preceding fall semester, and in a fall course by the third week of the preceding spring semester.

**UB CURRICULUM CAPSTONE:**

You are completing this course as part of your UB Curriculum requirements, therefore please select an 'artifact' from this course that is representative of your learning and upload it to your UBPortfolio account. Templates have been created for this purpose. Artifacts include homework assignments, exams, research papers, projects, lab reports, presentations, and other course materials. Your final UB Curriculum requirement, UBC 399: UB Curriculum Capstone, will require you to submit these 'artifacts' as you process and reflect on your achievement and growth through the UB Curriculum. For more information, see the UB Curriculum Capstone website: <https://www.buffalo.edu/ubcurriculum/capstone.html>.

**COURSE FEES:** none other than registration.