

Course Title: Statistical data analysis and research methods
Course Subject Code: BMI **Course Number:** 504
Type of Instruction: SEM **Class Number:** 16556
Semester: Spring 2024

Version April 3, 2024

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1 Course Information

- Date(s)/Time(s): Thursdays Jan 25 – May 2 (Final Exam May 9), 10AM – 12.30/1PM
- Location: Remote
- Delivery Mode: Online synchronous (with availability of class-recordings afterwards)
- Number of Credits: 3
- Instructors
 - Course director: Werner Ceusters, MD (contact: 77 Goodell street, 5th floor, on appointment: wceusters@gmail.com)
 - Lecturers:
 - Statistics: Zackary Falls, PhD (contact: 77 Goodell street, 5th floor, on appointment: zmfalls@buffalo.edu)
 - All other topics: Werner Ceusters, MD (contact: 77 Goodell street, 5th floor, on appointment only through wceusters@gmail.com)

2 Course Description

- This course provides a thorough introduction to research design and methods used in biomedical sciences in general and biomedical informatics in particular. Its main aim is to enhance the students' quantitative and qualitative research skills. Five themes will be covered: (1) the fundamentals of scientific research; (2) elements of philosophy of science, (3) quantitative research methods including statistics; clinical epidemiology, population studies and big data; (4) theoretically informed qualitative research; and (5) integration of research methods in biomedical sciences, including biomedical informatics.
- Most classes in the course consists of a theoretical and practical part, either in-class, or in the form of assignments and tests. The theoretical parts are in the form of interactive lectures surveying the formulation of research questions, the development of testable hypotheses, the selection and application of appropriate research designs and methods, data collection and analysis methods. These skills are then applied in the practical parts most of which are components for a research proposal which students will develop for a topic in their interest, but satisfying the principles outlined below.
- At the end of the course, students should be able to apply the methods taught in subsequent courses and research projects and use them for the evaluation and production of research proposals and papers.
- Course prerequisites: none.

3 Student Learning Outcomes (SLO)

3.1 *Mapping of course learning outcomes to program and institutional outcomes and competencies.*

Course Learning Outcomes; students will be able to:	BMI Graduate Program Outcomes / Competencies	Instructional methods	Assessment
1. Explain the fundamentals of scientific inquiry	O1: The most widely used clinical and informatics research methods	Lectures: C1, C2, C3, C5, C7, C8 Readings: R1, R2, R3, R6, R8	Tests: T1, T2 Assignments: A2, A3 Final exam
2. Articulate research questions	O2: The generation, acquisition, modeling, representation, and management of evidence-based knowledge sources for decision support O3: The characteristics of public health data as distinguished from clinical healthcare data	Lectures: C1, C2, C3, C5 Discussion: C4	Assignments: A1 Tests: T2 Final exam
3. Assess the quality of quantitative and qualitative studies	O1: The most widely used clinical and informatics research methods O4: Methods of data representation, manipulation, storage, analysis and mining in healthcare and biomedical research databases	Lectures: C3, C5, C6, C12 Discussion: C4 Guided exercise: C13	Assignments: A6
4. Understand and apply the concept of hypothesis in quantitative studies	O1: The most widely used clinical and informatics research methods. O5: Technical approaches to acquiring, modeling, representing and managing healthcare and biomedical research knowledge	Lectures: C2, C7, C8, C12 Discussion: C4	Assignments: A2, A3, A6 Final exam

5. Explain the role of causal theories in the design and interpretation of quantitative studies	O6:Research & data management methods with large clinical populations, including clinical trials O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C2, C5, C7, C8, C12 Discussion: C4 Guided exercise: C5	Assignments: A2, A3, A6 Final exam
6. Understand and use statistical methods for calculating summary estimates, measures of variability and confidence intervals	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C5, C10, C11	Assignment: A5 Test: T3 Final exam
7. Understand probabilities and discrete and continuous distributions	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C3, C9, C10, C11	Tests: T3 Assignment: A5 Final exam
8. Carry out and interpret a variety of tests of significance	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C3, C9, C11	Assignment: A5 Final exam
9. Understand and use power and sample size calculations	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C3, C11	Assignment: A5 Final exam
10. Use theory in qualitative research	O1:The most widely used clinical and informatics research methods	Lectures: C2, C6, C7, C8	Assignments: A2, A3, A6
11. Explain different forms of qualitative inquiry, including interviews, focus groups and observations and understand their benefits and limitations	O8:Information retrieval and critical analysis skills	Lectures: C6, C7	Assignments: A2, A6 Final exam
12. Explain and use different tools for qualitative data analysis	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C6, C7	Assignment: A6
13. Judge the suitability of different statistical methods to describe research findings	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C9, C10, C11	Assignment: A5 Final exam
14. Construct a coherent research proposal that includes an abstract, introductions, literature review, research questions, ethical considerations, and methodology	O9:Ethical theories and challenges in Biomedical Informatics	Lectures: C1, C2, C3, C5, C6, C7, C12 Discussion: C4 Guided exercise: C13	Assignment: A6
15. Present and defend a research proposal in public	O7:The essential components of clinical and biomedical data statistical analysis	Lectures: C1, C2, C5, C6, C8, C10, C11, C12 Discussion: C4	Assignments: A7, A8
16. Reflect critically on the extent to which this course contributed to an increase in the skills and competencies you deem important for your future career	O8:Information retrieval and critical analysis skills		Final exam

3.2 Mapping of course learning outcomes to institutional outcomes and competencies.

Applicable institutional outcomes	Instructional methods	Assessment
UB1. Demonstrate domain expertise, including critical reasoning and analysis.	Lectures: C1, C2, C3, C5, C6, C7, C8, C9, C10, C11, C12 Readings: R1-R11	Tests: T1, T2, T3 Assignments: A1-A8 Final exam
UB2. Apply effective communication, information, and digital literacy skills.		Assignments: A6, A7 Final Exam
UB3. Demonstrate ethical and professional responsibility and act according to the norms of the chosen discipline.	Discussions: C4 Guided exercises: C5, C13	Assignment: A8

- The main assignment is A6, a fully worked out proposal for a scientific research project to be built according to precise specifications given during the course. Parts of this proposal are the subject of separate assignments A1, A2, A3 and A4. This approach gives the students the opportunity to receive feedback on these components so that they can be improved for inclusion in the final version. Grades received for these assignments **do not count towards the final grade**, but are to be seen as an indication of how that part of the proposal would be assessed were it included as such in the final proposal. There is thus no requirement to do assignments A1, A2, A3, and A4, but when they are not done in due time, i.e. prior to the due date and time, no intermediate feedback on the respective parts will be provided. Not receiving feedback on overdue assignments may of course have a negative effect on the overall score of A6.
- When assignment A5 is not delivered in time, a penalty of 1% of the positive final score will be applied for every 24 hours of delay. When this assignment is not delivered at all, the penalty will be equal to the % for which the assignment counts towards the final grade. Assessment criteria for assignments will be covered in detail in the slides and discussed in the relevant classes.

5 GRADING POLICY

- Grading follows standard graduate policies (<https://www.buffalo.edu/grad/succeed/current-students/policy-library.html?q=grading>)
- Learning assessments will be graded based on rubric criteria and weighted according to the following detailed break-down. If the final results for all students are outside the expected range, curve grading might be used at the discretion of the course director.

Class	Date	Instructor	Pre-class required readings	Assessments	Due dates	Final Score weight
C1	25-Jan	Ceusters (1)	R1	Post-class assignment A0		
C2	01-Feb	Ceusters (2)	R2			
C3	08-Feb	Ceusters (3)	R3	In-class closed book test T1		2%
C4	15-Feb	Ceusters (4)	R4, R5, R6	Post-class assignment A1	Feb 23 - noon	
C5	22-Feb	Ceusters (5)	R7	In-class closed book test T2		3%
C6	29-Feb	Ceusters (6)	R8	Post-class assignment A2	March 5 - noon	
C7	07-Mar	Ceusters (7)	R9			
C8	14-Mar	Ceusters (8)	R10	Post-class assignment A3	March 26 - noon	
Spring break						
C9	28-Mar	Ceusters (9)		Post-class assignment A4	April 3 - noon	
C10	04-Apr	Ceusters (10)	R11, R12	In-class closed book test T3		3%
C11	11-Apr	Falls (1)	R13	Post-class assignment A5	April 25 - noon	5%
C12	18-Apr	Ceusters (11)				
C13	25-Apr	Ceusters (12)	R14	Post-class assignments A6 , A7	May 6 – 9am May 1 - noon	37% 5%
C14	02-May	Ceusters (13)		In-class presentation A8		15%
EXAM	09-May	Ceusters (14)		In-class open-book exam		30%
TOTAL						100%

8% interim acquired knowledge tests (T1, T2, T3)
 8% interim statistics understanding (A4, A5)
 34% research proposal writing
 5% quality of slides for final presentation
 15% quality of final oral presentation of research proposal
 30% final exam

Final Grades:

Grade	Quality Points	Percentage
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

6 COURSE FEES

Standard UB tuition and fees. No extra costs, except for students wishing to purchase the statistics handbook.

C1. Jan 25 / Ceusters / Course introduction – Introduction to research and research proposals

Required reading pre-class:

- R1** Shortliffe, E.H., *The organization and content of informatics doctoral dissertations*. J Am Med Inform Assoc, 2016. 23(4): p. 840-3.
<https://academic.oup.com/jamia/article/23/4/840/2201488> [1]

Class structure:

- Participant and instructor introduction
- Course introduction, housekeeping rules, expectations, course project work
- Traditional lecture on the structure of research proposals

Post-class assignments:

- Required reading
R2 Wagensberg, J., *On the Existence and Uniqueness of the Scientific Method*. Biol Theory, 2014. 9(3): p. 331-346.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4131153/pdf/13752_2014_Article_166.pdf [2]
- A0**: Reflect about your research interests concerning your future MSc or PhD thesis and formulate a number of research topics. These topics should for BMI students fit at least one of the detailed learning objectives for biomedical informaticists described in the document '*BMI504-Spring2024-topic-requirements.pdf*'. For students outside the BMI department, any topic will do. Be prepared to present and discuss this informally in class C2. No prior submission needed.

C2. Feb 1 / Ceusters / Fundamentals of science and research

Required reading pre-class:

- R2** Wagensberg, J., *On the Existence and Uniqueness of the Scientific Method*. Biol Theory, 2014. 9(3): p. 331-346.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4131153/pdf/13752_2014_Article_166.pdf [2]

Class structure:

- Traditional lecture on (1) philosophy of science and research and (2) the scientific method
- Students will report on pre-class assignment (b) and explain their ideas, each presentation followed by discussion.

Post-class assignment:

Required reading:

- R3** Ioannidis, J.P., *Why most published research findings are false*. PLoS Med, 2005. 2(8): p. e124.
<https://www.ncbi.nlm.nih.gov/pubmed/16060722> [3]
!!! This paper will be the topic of a closed book in-class test during class C3 !!!

C3. Feb 8 / Ceusters / Parameters for research designs

Pre-class reading:

- R3** Ioannidis, J.P., *Why most published research findings are false*. PLoS Med, 2005. 2(8): p. e124.
<https://www.ncbi.nlm.nih.gov/pubmed/16060722> [3]

Class structure:

- T1**: Assessment of **R3**: in-class test (closed book) followed by discussion of correct answers.
- Lecture introducing various research designs

Post-class assignment:

- Optional reading:
R4. Abbasi, K., *Covid-19: politicisation, "corruption," and suppression of science*. BMJ, 2020. 371: p. m4425.
<https://www.bmj.com/content/371/bmj.m4425> [4]
- Required readings:
R5 Ioannidis, J.P., *Why Most Clinical Research Is Not Useful*. PLoS Med, 2016. 13(6): p. e1002049.
<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002049> [5]
R6 Ozonoff, D.M. and P. Grandjean, *What is useful research? The good, the bad, and the stable*. Environ Health, 2020. 19(1): p. 2.[6]
<https://ehjournal.biomedcentral.com/articles/10.1186/s12940-019-0556-5>

- c) On the basis of the lecture and papers **R4**, **R5** and **R6**, reflect further on concrete topics for your research proposal, and pick one for presentation during C4.

C4. Feb 15 / Ceusters / Planning of research projects

Pre-class readings:

- R4.** Abbasi, K., *Covid-19: politicisation, "corruption," and suppression of science*. BMJ, 2020. **371**: p. m4425.
<https://www.bmj.com/content/371/bmj.m4425> [4]
- R5** Ioannidis, J.P., *Why Most Clinical Research Is Not Useful*. PLoS Med, 2016. **13**(6): p. e1002049.
<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002049> [5]
- R6** Ozonoff, D.M. and P. Grandjean, *What is useful research? The good, the bad, and the stable*. Environ Health, 2020. **19**(1): p. 2.[6]
<https://ehjournal.biomedcentral.com/articles/10.1186/s12940-019-0556-5>

Class structure:

Discussion of individual proposals. At the end of the class, the scope and goals of the projects should be clear.

Post-class assignment:

- a) **A1**: Taking into account the content of all previous BMI504 lectures and papers, students must write an outline for their individual research project in the spirit of the scientific method thereby adapting the original ideas discussed in class in such a way that Ioannidis' features for assessing whether *clinical* research is useful come out positive for what they propose. This should be backed up by an initial literature study. Format requirements detailed in the proposal layout document.
Due date: February 23 – noon.

- b) Required reading:

- R7** Delgado-Rodriguez, M. and J. Llorca, *Bias*. J Epidemiol Community Health, 2004. **58**(8): p. 635-41.
<https://jech.bmj.com/content/58/8/635> [7]

!!! This paper will be the topic of a closed book in-class test during class C5 !!!

C5. Feb 22 / Ceusters / Types of Bias

Pre-class reading:

- R7** Delgado-Rodriguez, M. and J. Llorca, *Bias*. J Epidemiol Community Health, 2004. **58**(8): p. 635-41.
<https://jech.bmj.com/content/58/8/635> [7]

Class structure:

- a) Question answering re required reading
b) **T2**: Assessment of **R7**: in-class test (closed book)
c) Interactive lecture on various types of bias, followed by guided exercise.

Post-class assignment:

Suggested reading:

- R8** Sudheesh, K., D.R. Duggappa, and S.S. Nethra, *How to write a research proposal?* Indian journal of anaesthesia, 2016. **60**(9): p. 631-634.
https://journals.lww.com/ijaweb/Fulltext/2016/60090/How_to_write_a_research_proposal_.4.aspx [8]

C6. Feb 29 / Ceusters / Qualitative research methods: theory and data collection methods

Pre-class reading:

- R8** Sudheesh, K., D.R. Duggappa, and S.S. Nethra, *How to write a research proposal?* Indian journal of anaesthesia, 2016. **60**(9): p. 631-634.
https://journals.lww.com/ijaweb/Fulltext/2016/60090/How_to_write_a_research_proposal_.4.aspx [8]

Class structure:

Lecture on common qualitative data collection methods (Document Review, Observation, Interview (face-to-face), Focus Group Discussion, Ethnography, ...)

Post-class assignment:

Required reading:

- a) **R9** Palinkas, L.A., et al., *Mixed method designs in implementation research*. Adm Policy Ment Health, 2011. **38**(1): p. 44-53.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3025112/pdf/10488_2010_Article_314.pdf [9]
- b) **A2**: Students will update the first version of their research proposal (**A1**) so as to include all elements discussed in class and covered in the required readings thus far. Detailed instructions about format will be provided in class.
Due date: March 5 – noon

C7. Mar 7 / Ceusters /Mixed methods: Integration of quantitative and qualitative methods

Pre-class reading:

- R9** Palinkas, L.A., et al., *Mixed method designs in implementation research*. Adm Policy Ment Health, 2011. **38**(1): p. 44-53.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3025112/pdf/10488_2010_Article_314.pdf [9]

Class structure:

- a) The first part will be an interactive lecture covering the topic.
- b) The second part will consist of a guided discussion aimed at determining the best research design to (dis)confirm hypotheses proposed for the individual research projects and to include an experimental design requiring a mixed design if not yet present in the original research proposal.

Post-class assignment:

- c) Required reading:
R10 Almoznino, G., et al., *The Dental, Oral, Medical Epidemiological (DOME) Study: Protocol and Study Methods*. Methods Inf Med, 2020. **59**(4-05): p. 119-130. [10]
<https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0040-1718582>

C8. Mar 14/ Ceusters / Introduction to data analysis of quantitative and qualitative variables

Pre-class reading:

- R10** Almoznino, G., et al., *The Dental, Oral, Medical Epidemiological (DOME) Study: Protocol and Study Methods*. Methods Inf Med, 2020. **59**(4-05): p. 119-130. [10]
<https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0040-1718582>

Class structure: interactive lecture

Post-class assignment:

A3: Based on the slides and references used in C8, students must rewrite their individual research project so that it satisfies all requirements with respect to (1) the precise research question, (2) the null-hypothesis, (3) the statistical null-hypothesis, (4) determination of all relevant variables (independent and dependent variables plus suggested methods for computing outcome variables) and (5) theoretical and operational linkage. Detailed instructions about format will be provided in class.
Due date: March 26 – noon.

C9. Mar 28 / Ceusters / Elements of epidemiology

Class structure:

Lecture covering essential notions in population studies such as incidence, prevalence, mortality ratios, validity, reliability, sensitivity, and specificity, etc...

Post-class assignment:

- a) **A4** Update, where needed, the proposal on the basis of C8 and C9-materials. This version will be used by the instructor of C11 to make that class maximally relevant to the students' research proposals.
Due date: April 3 – noon.
- c) Required reading:
R11 McCluskey, A. and A.G. Lalkhen, *Statistics II: Central tendency and spread of data*. Continuing Education in Anaesthesia Critical Care & Pain, 2007. **7**(4): p. 127-130.
<https://academic.oup.com/bjaed/article/7/4/127/466523> [11]
R12 Cohen, H.W., *P values: use and misuse in medical literature*. Am J Hypertens, 2011. **24**(1): p. 18-23.. [12]
<https://academic.oup.com/ajh/article/24/1/18/165807>
!!! This paper will be the topic of a closed book in-class test during class C10 !!!

C10. Apr 04 / Ceusters / Descriptive and elementary statistics

Pre-class reading:

- R11** McCluskey, A. and A.G. Lalkhen, *Statistics II: Central tendency and spread of data*. Continuing Education in Anaesthesia Critical Care & Pain, 2007. 7(4): p. 127-130.
<https://academic.oup.com/bjaed/article/7/4/127/466523> [11]
- R12** Cohen, H.W., *P values: use and misuse in medical literature*. Am J Hypertens, 2011. 24(1): p. 18-23.. [12]
<https://academic.oup.com/ajh/article/24/1/18/165807>

Class structure:

- a) **T3**: closed book test on paper **R12**.
- b) Lecture covering the theories and applications of average value, median, mode, variance, standard deviation, inter-quartile range, skewness, kurtosis, histogram, box and whisker plot.

Post-class assignments:

Suggested reference book:

- R13** Norman, G. and D. Streiner, *Biostatistics : The Bare Essentials*. 2014, Shelton, UNITED STATES: People's Medical Publishing House. [13]
Accessible through UB Libraries login: <http://ebookcentral.proquest.com/lib/buffalo/detail.action?docID=3386956>

C11. Apr 11/ Falls / Statistical analysis

Pre-class reading:

Suggested reference book:

- R13** Norman, G. and D. Streiner, *Biostatistics : The Bare Essentials*. 2014, Shelton, UNITED STATES: People's Medical Publishing House. [13]
Accessible through UB Libraries login: <http://ebookcentral.proquest.com/lib/buffalo/detail.action?docID=3386956>

Class structure:

Lecture plus guided group work on statistics relevant to the students' research proposals. Completed assignments A4 will be used to determine the relevant content of the class. Possibilities are: Discrete and Continuous Distributions, the Normal Distribution, the Central Limit Theorem, Population vs Sample, Hypothesis Testing and Confidence Intervals (Z-test, t-test, Chi-Square Test, Fisher Exact, non-parametric), Power and Sample Size Calculations for One and Two-Sample Hypothesis tests.

Post-lecture assignment:

- A5: Part 1:** For each student, questions will be designed addressing statistical problems relevant to the student's individual research project. Students will be expected to formally answer these questions with full, detailed explanations.
- Part 2:** Students will be given a mockup biomedical dataset and a set of questions related to the dataset. They must use the statistical skills and tests they were taught in the lecture to assess the characteristics of the dataset and select and carry out the appropriate statistical tests to answer the questions posed.

Due date: April 25 – noon

C12. Apr 18 / Ceusters / Clinical trial design

Class structure:

Lecture on cohort study design, clinical study design, analysis of clinical trials, randomized controlled clinical trials, 2x2 factorial designs, cross over designs.

Post-lecture assignment:

- a) Required reading:
R14 Mårtensson, P., et al., *Evaluating research: A multidisciplinary approach to assessing research practice and quality*. Research Policy, 2016. 45(3): p. 593-603.
<https://www.sciencedirect.com/science/article/pii/S0048733315001845> [14]

C13. Apr 25 / Ceusters / Final wrap-up of research proposals

Class structure:

- Discussion of required presentation format (slides-A7 and oral presentation – A8).
- Final outstanding questions related to final proposal A6.

Post-lecture assignment:

- a) Students will complete their final research proposal (A6) and prepare a Powerpoint presentation (A7) of this proposal for formal presentation (A8) during C14.
Due date for A6: May 6 – 9am
Due date for A7: May 1 – noon

C14. May 2 / Ceusters / Presentation of final research proposals

Class structure: presentation of research proposals. Each student has 150 minutes divided by number of students participating, 75% of time for presentation, 25% for questions.

C15. FINAL EXAM: May 9 / 10AM

The final exam will be held **IN PERSON, Dept of BMI, 77 Goodell St, Buffalo, NY 14203, 5th floor, room 506**. It will be composed of questions and exercises covering the complete content of the course. Students may use any documentation they consider useful to consult during the exam, whether or not used during the course. They must do the exam however alone!

8 ATTENDANCE POLICY

Students are expected to attend *all* classes. For religious observances, university sanctioned events, athletic commitments and family/work obligations/emergencies, absences may be granted upon request and subsequent approval by the course director *prior* to the absence. Requests are to be sent by email. Medical absence must be accompanied by a doctor's note. Even if absence is granted, it can have an effect on the finally obtained grade (see grading policy) unless additional coursework in replacement for missed graded activities is performed.

For course cancellation/emergency planning, see the university website for cancellations/delays due to weather or other unforeseen events (<http://www.buffalo.edu/administrative-services/emergency-management/emergency-procedures.html>)

9 ACADEMIC INTEGRITY

- Academic integrity is a fundamental university value. Through the honest completion of academic work, students sustain the integrity of the university while facilitating the university's imperative for the transmission of knowledge and culture based upon the generation of new and innovative ideas. See <http://grad.buffalo.edu/Academics/Policies-Procedures/Academic-Integrity.html>.
- Students may collaborate for the assignments in which case the submitted materials should be clearly labeled as such, with the names of all collaborating students. In case students who collaborate cannot come to a consensus for certain parts of the work, alternate solutions proposed by individual students should be clearly marked as such. Grading of individual students will take into account such alternatives.

10 CLASSROOM DECORUM

Students are expected to arrive in due time for each class. Most lectures will start with a pre-lecture test to assess the student's level of preparation for the class. This test contributes to the final grading. Use of cell phones and laptops is allowed for the purposes of the class, but not for private reasons. Additional rules of conduct, when applicable, will be explained by the instructors prior to the class.

11 ACCESSIBILITY RESOURCES

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources, 25 Capen Hall, 645-2608, and also the course director of this course. The office will provide you with information and review appropriate arrangements for reasonable accommodations. <https://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html>.

12 UNIVERSITY SUPPORT SERVICES

Students are often unaware of university support services. For example, the Center for Excellence in Writing provides support for written work, and several tutoring centers on campus provide academic success support and resources.

13 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](https://www.buffalo.edu/equity.html) at (716) 645-2266 for more information. <https://www.buffalo.edu/equity.html>

14 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