I. Course Description

The earliest concept of screening for disease arose in the early 1900's with the advent of x-rays, which allowed, literally, for viewing lungs on a "screen". The rise of screening has also been attributed to public health approaches that were employed to "screen" out pollutants from water or to protect from vector-borne diseases. The earliest application of x-rays was to identify tuberculosis. Use of x-rays for tuberculosis led to realization that the technology allowed for the early diagnosis of latent tuberculosis, thereby offering the opportunity for treatment and control of its spread in the population. Another early application of screening was to determine the mental health suitability of army recruits in World War I.

Since the World War II era, screening for disease has become a routine part of medical care. Thirty-six of the 55 U.S. Preventive Services Task Force evidence-based recommendations with an A or B grade are for screening in areas such as cancer, pregnancy, cardiovascular disease, mental health, and obesity, among others. Despite the U.S. Preventive Services Task Force imprimatur on screening recommendations, routine screening is complicated not only by conflicting evidence of its efficacy, leading to disagreement among professional medical societies, but also by increasing recognition of potential physical and psychological harms that may outweigh benefits. In addition, social, economic and political forces shape screening application and policy decisions, such as whether or not to provide insurance coverage for screening tests. For example, the 2009 U.S. Preventive Task Force recommendations to change the age at which to begin and frequency of mammography for breast cancer led to a public outcry. Advocacy groups and professional medical societies opposed to the changes lobbied
Congress to keep the old recommendations. They claimed the revised recommendations would result in unnecessary deaths. However, it should be noted that reducing mammography frequency and narrowing the age range for women to be screened would also likely reduce reimbursement for clinical screening services.

The aim of this course, then, is to provide a comprehensive overview of screening methods and evaluation, and to examine the efficacy, benefits versus harms, population uptake, screening promotion, and controversies surrounding specific screening tests for various health conditions. These include, but are not limited to, cancer, cardiovascular disease, infectious disease, mental health and newborn metabolic and genetic defects. Such controversies can range from overdiagnosis and unnecessary treatment, informed decision-making, screening policies, and ethical issues. The course is designed to appeal to students in Public Health, Nursing, Pharmacy, Medicine, genetic counseling and public policy.

II. **Course Prerequisites**

Graduate or professional student in the Academic Health Center; completion of a course on epidemiologic, biostatistics or research methods; or by permission of instructor.

III. **Course Goals and Objectives**

At the conclusion of this course, the student will be able to:

1. Know the criteria for when screening is appropriate and what constitutes a suitable screening test; be able to define and/or calculate measures of screening accuracy, receiver operator curves, quality-adjusted life years, number needed to screen, etc;
2. Recognize different epidemiologic study designs used to determine screening efficacy, identify biases that may affect interpretation of study results, describe strengths and weaknesses of each study design;
3. Interpret trends in screening health outcomes in relation to population level screening;
4. Name key organizations responsible for making screening recommendations and identify the challenges in reaching consensus for screening guidelines;
5. Describe barriers, facilitators and strategies for screening uptake at the individual and health system levels;
6. Understand the use of decision models to determine the effectiveness and cost-effectiveness of screening; and
7. Summarize the evidence on screening for specific diseases, weigh the benefits versus harms, and identify related controversies.

IV. **Methods of Instruction and Work Expectations**

Class sessions will consist of lectures by either the instructor and/or guest faculty and class discussion of the readings and/or in-class activities. At the conclusion of each lecture, students will submit a 1-minute paper, consisting of one concept learned and one question remaining from the day’s lecture(s). For some lectures, described in the Course Outline, students will be assigned in a group to serve as the discussant panel following the guest lecture.

V. **Course Text and Readings**

**Note:** Morrison, AS. *Screening in Chronic Disease, 2nd edition.* New York: Oxford University Press, 1992, is an excellent text on screening methods. You will be able to purchase Chapters 2 and 3 from the copy center in Coffman Union. If you are interested in additional chapters, I am happy to loan you my copy.

Otherwise, assigned readings are listed under Course Outline/Weekly Schedule.
VI. Course Outline/Weekly Schedule

The presentation of course material is divided into three parts: Methods, Practice, and Controversies.

**Methods**

<table>
<thead>
<tr>
<th>September 7</th>
<th>Speaker(s):</th>
<th>Topic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Instructor</td>
<td>Epidemiologic concepts of screening for disease: natural history of disease, lead time, sensitivity</td>
</tr>
</tbody>
</table>

**Class activity**

We will review and discuss our own personal screening recommendations. Please come to class with this widget for primary care clinicians downloaded to your laptop or phone:

http://www.uspreventiveservicestaskforce.org/Page/Name/tools-and-resources-for-better-preventive-care

*Also read and be prepared to discuss:*

- Chapman AL. The concept of multiphasic screening: Public Health Reports 1949;64:1311-1314

**Required readings:**

- Chapter 16: Screening in Public Health Practice in Aschengrau A and Seage GR, Essentials of Epidemiology in Public Health, 2nd edition
- Morrison AS: Screening in Chronic Disease, 2nd edition: Chapter 2, The Natural History of Disease in Relation to Measures of Disease Frequency (just skim page 30)

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<thead>
<tr>
<th>September 14</th>
<th>Speaker(s):</th>
<th>Topic:</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Tim Church, Ph.D.</td>
<td>Randomized controlled trials of screening efficacy</td>
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</tbody>
</table>

**Class Activity**

To be determined by Dr. Church

**Required readings:**


<table>
<thead>
<tr>
<th>September 21</th>
<th>Speaker(s):</th>
<th>Topic:</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Instructor</td>
<td>Observational studies of screening efficacy</td>
</tr>
</tbody>
</table>

Class activity
Required readings:


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<tr>
<th>September 28</th>
<th>Speaker(s):</th>
<th>Topic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Karen Kuntz, Sc.D.</td>
<td>Primer on use of decision models for evaluating screening</td>
</tr>
<tr>
<td>Class Activity</td>
<td>Build a decision model.</td>
<td></td>
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</table>

Required readings:


**Practice**

<table>
<thead>
<tr>
<th>October 5</th>
<th>Speaker(s):</th>
<th>Topic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 1</td>
<td>Tim Wilt, M.D., M.P.H.</td>
<td>The U.S. Preventive Services Task Force</td>
</tr>
<tr>
<td>Lecture 2</td>
<td>Instructor</td>
<td>Framework for screening practice, trends</td>
</tr>
</tbody>
</table>

Class activity

Read the following articles and be prepared to compare, contrast and answer questions in small discussion groups:


Required readings:

- U.S. Preventive Services Task Force Standards for Guideline Development.pdf
• Harris RP, Wilt TJ, Qaseem A; High Value Care Task Force of the American College of Physicians. Ann Intern Med 2015;162:712-7

<table>
<thead>
<tr>
<th>October 12</th>
<th>Speaker(s):</th>
<th>Topic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture I</td>
<td>Instructor</td>
<td>Screening harms versus benefits</td>
</tr>
<tr>
<td>Lecture 2</td>
<td>Melissa Partin, Ph.D.</td>
<td>Informed decision making</td>
</tr>
<tr>
<td>In-class activity</td>
<td>Prior to class, read the following two papers. You will be asked to consider the patient and physician's point of view, and debate the pros and cons of their position.</td>
<td></td>
</tr>
</tbody>
</table>

Required readings:
• Stefanek ME. Uninformed compliance or informed choice? A needed shift in our approach to cancer screening. JNCI 2011;103:1-6.

<table>
<thead>
<tr>
<th>October 19</th>
<th>Speaker(s):</th>
<th>Topic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 1</td>
<td>Rebekah Nagler, Ph.D.</td>
<td>Communication about screening</td>
</tr>
<tr>
<td>Lecture 2</td>
<td>Instructor</td>
<td>Interventions for screening</td>
</tr>
</tbody>
</table>

Required readings (need to shorten):
• Nagler RK, Lueck JA, Gray LS. Awareness of and reactions to mammography controversy among immigrant women. Health Expectations 2016; in press

October 26
Speaker(s): Shelley Madigan
Instructor: Charles Rogers
Topic: Inequities in screening
Panel: Screening the under-insured
Social: Screening among African American men

Required readings:
• More papers to be added...

Controversies

NOTE: During this section of the semester, guest lecturers will present for about an hour. The remainder of the time will be used to engage students in active learning exercises developed by the instructor around new public health core competencies, such analytical and assessment skills, policy development and program planning, communication, cultural competency, community engagement, leadership and systems thinking.

November 2
Speaker(s): Russell Luepker, M.D, M.S.
Topic: Screening for cardiovascular disease

Class activity: Bring three talking points from the class readings for discussion.

Required readings:
• http://www.heart.org/HEARTORG/Conditions/Heart-Health-Screenings_UCM_428687_Article.jsp
- Maron BJ. Historical perspectives on sudden deaths in young athletes with evolution over 35 years. Am J Cardiology 2015; 116:1461-68.

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<thead>
<tr>
<th>November 9</th>
<th>Speaker(s):</th>
<th>Topic:</th>
</tr>
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<tbody>
<tr>
<td>Lecture</td>
<td>Alan Lifson, M.D., M.P.H.</td>
<td>Screening for HIV</td>
</tr>
<tr>
<td>Class activity</td>
<td>Bring three talking points from the class readings for discussion.</td>
<td></td>
</tr>
</tbody>
</table>

Required readings:
- Centers for Disease Control and Prevention. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR 2006; 55 (No. RR-14).

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<tr>
<th>November 16</th>
<th>Speaker(s):</th>
<th>Topic:</th>
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<tbody>
<tr>
<td>Lecture</td>
<td>Susan Berry, M.D.</td>
<td>Newborn screening</td>
</tr>
<tr>
<td>Class activity</td>
<td>Bring three talking points from the class readings for discussion.</td>
<td></td>
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</tbody>
</table>

Required readings:
- Advisory Committee on Heritable Disorders in Newborns and Children: http://www.hrsa.gov/advisorycommittees/mchbadvisory/heritabledisorders/
- Newborn Screening Program: Minnesota Department of Health: http://www.health.state.mn.us/newbornscreening/
November 23  
Speaker(s):  
Topic:  
Lecture  
TBD  
Screening for diabetes (Type I, II, gestational--tbd)  
Class activity  
Bring three talking points from the class readings for discussion.

Required readings:
- Standards of Medical Care in Diabetes--2015. Diab Care, 2015; 38, Supplement 1, S1 - S30.

November 30  
Speaker(s):  
Topic:  
Lecture  
Shalini Kulasingam, Ph.D.  
Prevention, Early Detection or Both? Cervical cancer screening in the age of HPV vaccination  
Class activity  
Bring three talking points from the class readings for discussion.

Required readings:

December 7  
Student Presentations  
December 14  
Student Presentations

VII. Evaluation and Grading

Written Assignment:
Students will prepare a paper on a screening-related topic that is not covered in class. Students may choose from among the topics listed below; other topics will be considered upon approval of the instructor. The requirements for the papers will vary depending on whether the student chooses an epidemiologic or behavioral approach to the paper.

This checklist from Wald and Cuckle may be helpful to you in preparing your written assignments.

First assignment (epidemiologic or behavioral approach): **Due October 3**

- Review the prevalence of the condition, test characteristics of the screening test, uptake of the screening test in the population, and screening guidelines. Note if different organizations issue conflicting guidelines (3-5 pages, double spaced, 12 point font).

Second assignment: **Due October 31**

- Epidemiologic approach: Review efficacy of specific screening test, including a discussion of strengths and weaknesses of the evidence to date.
- Behavioral approach: Briefly note evidence for or against screening, but the primary purpose is to identify interventional approaches that have been assessed to increase (or decrease) use of the selected screening test. Indicate which approaches have the most likelihood of success. (5-10 pages, double spaced, 12 point font)

Third assignment (epidemiologic or behavioral): **Due November 28**

- Review gaps and controversies for specific screening test or its application in the population. Identify opportunities for future research. (3-5 pages, double spaced, 12-point font)

**Suggested topics for written assignment/presentations:**

- Screening for melanoma
- Screening for ovarian cancer
- Screening for oral cancer
- Screening for Hepatitis B/C
- Screening for osteoporosis
- Screening for tuberculosis
- Screening for obesity
- Genetic screening
- Screening for sexually transmitted diseases
- Screening for hearing and vision (among children, among elderly)
- Screening for cognition among elderly
- Screening during pregnancy
- Screening for mental health conditions (e.g., depression, PTSD)
- Screening for autism spectrum disorder
- Screening interventions
- Screening in special populations (refugees, disabled, race/ethnicity, socioeconomic status)
- Screening in developing countries
- Other, with approval of instructor

**Presentations: December 7 and 14**

- Students will prepare a presentation that reflects the content of their completed written assignments. These presentations will serve to expand the list of screening topics covered in this class. The length of the presentation will be determined at the beginning of class, according to enrollment size.

**Final assignment: Due Friday, December 16**

- Students will prepare a 1-page fact sheet that summarizes their written assignments for their selected screening test but in language suitable for the lay public.
Class participation:

Class participation is paramount to the success of this course. To that end, students will come to class having read the assigned readings, and will be prepared to engage in the planned class activity.

Percent of grade:

Written assignments: 20% each, for a total of 60% of earned grade
Fact Sheet: 15%
Presentations: 15%
Class participation: 10%; 8% total for attending each class, and participating in class discussion and activities; 2% for submitting a 1-minute paper at the conclusion of each class. These percentage points can only be earned if the student attends class; points earned will be pro-rated according to the number of classes attended and the number of 1-minute papers submitted.
Extra credit options: 2% (pro-rated), complete the weekly lecture evaluation.

Grades

A 4.000 - Represents achievement that is outstanding relative to the level necessary to meet course requirements
A- 3.667
B+ 3.333
B 3.000 - Represents achievement that is significantly above the level necessary to meet course requirements
B- 2.667
C+ 2.333
C 2.000 - Represents achievement that meets the course requirements in every respect
C- 1.667
D+ 1.333
D 1.000 - Represents achievement that is worthy of credit even though it fails to meet fully the course requirements
S Represents achievement that is satisfactory, which is equivalent to a B- or better.

For additional information, please refer to:
http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html.

Course Evaluation

The SPH will collect student course evaluations electronically using a software system called CoursEval: www.sph.umn.edu/courseval. The system will send email notifications to students when they can access and complete their course evaluations. Students who complete their course evaluations promptly will be able to access their final grades just as soon as the faculty member renders the grade in SPHGrades: www.sph.umn.edu/grades. All students will have access to their final grades through OneStop two weeks after the last day of the semester regardless of whether they completed their course evaluation or not. Student feedback on course content and faculty teaching skills are an important means for improving our work. Please take the time to complete a course evaluation for each of the courses for which you are registered.

Incomplete Contracts

A grade of incomplete "I" shall be assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., documented illness or hospitalization, death in family, etc.), the student was prevented from completing the work of the course on time. The assignment of an "I" requires that a contract be initiated.
and completed by the student before the last official day of class, and signed by both the student and
instructor. If an incomplete is deemed appropriate by the instructor, the student in consultation with the
instructor, will specify the time and manner in which the student will complete course requirements.
Extension for completion of the work will not exceed one year (or earlier if designated by the student's
college). For more information and to initiate an incomplete contract, students should go to SPHGrades at:
www.sph.umn.edu/grades.

University of Minnesota Uniform Grading and Transcript Policy - A link to the policy can be found at
onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)
For full-semester courses, students may change their grade option, if applicable, through the second week of
the semester. Grade option change deadlines for other terms (i.e. summer and half-semester courses) can
be found at onestop.umn.edu.

Course Withdrawal
Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for
information and deadlines for withdrawing from a course. As a courtesy, students should notify their
instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact
the School of Public Health Office of Admissions and Student Resources at sph-ssc@umn.edu for further
information.

Student Conduct Code
The University seeks an environment that promotes academic achievement and integrity, that is protective of
free inquiry, and that serves the educational mission of the University. Similarly, the University 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.

As a student at the University you are expected adhere to Board of Regents Policy: Student Conduct Code.
To review the Student Conduct Code, please see:

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."

Use of Personal Electronic Devices in the Classroom
Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for
the student using the device but also for other students in the class. To this end, the University establishes
the right of each faculty member to determine if and how personal electronic devices are allowed to be used
in the classroom. For complete information, please reference:

Scholastic Dishonesty
You are expected to do your own academic work and cite sources as necessary. Failing to do so is
scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations;
engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without
faculty permission; submitting false or incomplete records of academic achievement; acting alone or in
cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional
endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data,
research procedures, or data analysis. (Student Conduct Code:
http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf) If it is determined that a student has
cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the
University. For additional information, please see:
http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.
The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: [http://www1.umn.edu/oscai/integrity/student/index.html](http://www1.umn.edu/oscai/integrity/student/index.html). If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class—e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

**Makeup Work for Legitimate Absences**

Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see: [http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html](http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html).

**Appropriate Student Use of Class Notes and Course Materials**

Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: [http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html](http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html).

**Sexual Harassment**

"Sexual harassment" means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy: [http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf](http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf).

**Equity, Diversity, Equal Opportunity, and Affirmative Action**

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: [http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf](http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf).

**Disability Accommodations**

The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, [https://diversity.umn.edu/disability/](https://diversity.umn.edu/disability/).

**Mental Health and Stress Management**

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: [http://www.mentalhealth.umn.edu](http://www.mentalhealth.umn.edu).
The Office of Student Affairs at the University of Minnesota

The Office for Student Affairs provides services, programs, and facilities that advance student success, inspire students to make life-long positive contributions to society, promote an inclusive environment, and enrich the University of Minnesota community.

Units within the Office for Student Affairs include, the Aurora Center for Advocacy & Education, Boynton Health Service, Central Career Initiatives (CCE, CDes, CFANS), Leadership Education and Development – Undergraduate Programs (LEAD-UP), the Office for Fraternity and Sorority Life, the Office for Student Conduct and Academic Integrity, the Office for Student Engagement, the Parent Program, Recreational Sports, Student and Community Relations, the Student Conflict Resolution Center, the Student Parent HELP Center, Student Unions & Activities, University Counseling & Consulting Services, and University Student Legal Service.

For more information, please see the Office of Student Affairs at http://www.osa.umn.edu/index.html.

Academic Freedom and Responsibility: for courses that do not involve students in research

Academic freedom is a cornerstone of the University. Within the scope and content of the course as defined by the instructor, it includes the freedom to discuss relevant matters in the classroom. Along with this freedom comes responsibility. Students are encouraged to develop the capacity for critical judgment and to engage in a sustained and independent search for truth. Students are free to take reasoned exception to the views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled.*

Reports of concerns about academic freedom are taken seriously, and there are individuals and offices available for help. Contact the instructor, the Department Chair, your adviser, the associate dean of the college, or the Vice Provost for Faculty and Academic Affairs in the Office of the Provost.

* Language adapted from the American Association of University Professors "Joint Statement on Rights and Freedoms of Students".

Student Academic Success Services (SASS): http://www.sass.umn.edu:

Students who wish to improve their academic performance may find assistance from Student Academic Support Services. While tutoring and advising are not offered, SASS provides resources such as individual consultations, workshops, and self-help materials.

Template update 9/2014