



Course Proteomics: BIOL 6373-001 / BMEN 6391-001
Professor Hyuntae Yoo
Term Fall 2016
Meetings TR 1:00 PM-2:15 PM, FO 3.616

Professor's Contact Information

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General Course Information

Pre-requisites Biochemistry

Course Description

This course is the third in a sequence of four courses taught to students in the Masters in Biotechnology program. It is intended to be taught in the second year Fall Semester of their two year program. In addition to students in the MS Biotechnology program, students from the PhD and Masters and BS programs in Molecular and Cell Biology, Biochemistry and Bioinformatics are eligible for the course. The course utilizes both lectures and detailed discussions of primary articles to teach the students how modern mass spectrometry has led to our ability to understand the protein content, networks and functions of cells. The study of these concepts defines the field of proteomics. Exams for the PhD students will be lengthier and more rigorous than those for the MS and BS students.

Learning Outcomes

The student will learn how mass spectrometry combined with bioinformatics can define:

1. The identity of proteins with cells.
2. The sequence of proteins within cells.
3. The post-translational modifications of proteins.
4. The relative amounts of each protein in cells under different conditions (ex. cancer vs. normal).
5. The functional interactions of proteins within protein networks.

Required Texts & Materials

Introduction to Proteomics, Tools for the New Biology, Humana Press; by Daniel C. Liebler (2002)

Suggested Texts, Readings, & Materials

"Introducing Proteomics From concepts to sample separation, mass spectrometry and data analysis" by Josip Lovric (2010)
- Available as eBook in UTD McDermott library

See also the class schedule below.

*** These descriptions and timelines are subject to change at the discretion of the Professor.**

Assignments & Academic Calendar

[Topics, Reading Assignments, Due dates, Exam Dates]

NOTE: Class readings have been listed within “Topic” boxes. PDF files of the papers will be uploaded to eLearning on the first day of class (Aug 23). Assignments for oral presentations will be made on the second day (Aug 25). The chapter and corresponding assigned reading are expected to be read PRIOR to that class.

LECTURE SCHEDULE

LECTURE	DATE	TOPIC	CHAPTER
1	23 Aug	Organizational Meeting	
2	25 Aug	Review of Protein Structure	
3	30 Aug	Proteomics and the New Biology Aebersold and Mann <i>Nature</i> 422: 198-207, 2003	1
4	1 Sep	From Genomics to Proteomics Tyers et al. <i>Nature</i> 422: 193-197, 2003	N/A
5	6 Sep	The Proteome Taylor et al. <i>Nature Biotech.</i> 21: 281-286, 2003	2
6	8 Sep	Overview of Analytical Proteomics Kakhniashvili et al. <i>Mol. Cell Prot.</i> 3:501-509, 2004	3
7	13 Sep	Analytical Protein and Peptide Separations Low et al. <i>Proteom.</i> 2:1229-1239, 2002 Alvarez-Llamas et al. <i>Electrophoresis</i> 30, 4095–4108, 2009	4
8	15 Sep	Protein Digestion Techniques Olsen et al. <i>Mol. Cell Prot.</i> 3:608-614, 2004	5
9	20 Sep	Mass Spectrometers for Protein and Peptide Analysis Anderson et al. <i>Nature</i> 433: 77-83, 2005	6
10	22 Sep	Protein Identification by Peptide Mass Fingerprinting Baldwin <i>Mol. Cell Prot.</i> 3:1-9, 2004	7
11	27 Sep	Protein Sequence Analysis by Tandem Mass Spectrometry Peng and Gyri <i>J. Mass Spec.</i> 36:1083-1091, 2001	8
12	29 Sep	Protein identification with Tandem Mass Spectrometry Data Durr et al. <i>Nature Biotech</i> 22:985-992, 2004	9
13	4 Oct	SALSA: An algorithm for mining specific features of tandem MS data Hansen et al. <i>Anal. Chem.</i> 73:1676-1683, 2001	10
14	6 Oct	Mining Proteomes Washburn et al. <i>Nature Biotech.</i> 19:242-247, 2001	11
15	11 Oct	Protein Expression Profiling Han et al. <i>Nature Biotech</i> 19: 946-951, 2001	12
	13 Oct	EXAM 1 (1 pm, FO3.616)	
16	18 Oct	Identifying Protein-Protein Interactions and Protein Complexes Blagoev et al. <i>Nature Biotech</i> 21: 315-318, 2003	13
17	20 Oct	Mapping Protein Modifications Witze et al. <i>Nature Methods</i> 4: 798-806, 2007	14

18	25 Oct	New Directions in Proteomics Franck et al. <i>Mol. Cell. Proteomics</i> 8:2023-2033, 2008	15
19	27 Oct	Protein Chips and Arrays Gordus et al., <i>Mol. Syst. Biol.</i> 5:235,2009	N/A
20	1 Nov	Quantitative Chemical Proteomics Bantscheff et al. <i>Nature Biotech</i> 25: 1035-1044, 2007	N/A
21	3 Nov	The Application of Mass Spectrometry to Membrane Proteins Wu and Yates <i>Nature Biotech.</i> 21: 262-267, 2003	N/A
22	8 Nov	Proteomics and Human Disease Keshamouni et al. <i>J Proteome Res</i> 5:1143-1154, 2006 Keshamouni et al. <i>J Proteome Res</i> 8:35–47, 2009	N/A
23	10 Nov	Many Roles of Computation in Drug Discovery Jorgensen et al. <i>Science</i> 303: 1813-1818, 2004	N/A
24	15 Nov	The Biological Impact of MS-based Proteomics Cravatt et al. <i>Nature</i> 450: 991-1000, 2007	N/A
	17 Nov	<i>To be determined</i>	
25	29 Nov	Biomedical Informatics for Proteomics Boguski et al. <i>Nature</i> 422: 233-237, 2003; The Minimum Information about a Proteomics Experiment Taylor et al. <i>Nature Biotechnology</i> 25: 887-893, 2007	N/A
26	1 Dec	EXAM 2 (1 pm, FO3.616)	N/A

Course Policies

Grading (credit) Criteria	<p>Students are assessed based on:</p> <ol style="list-style-type: none"> 1. Two exams. 2. Oral presentations. <p>Your numerical grade will be calculated as follows:</p> <p>Exam 1: 35%</p> <p>Exam 2: 35%</p> <p>Oral presentation/Class participation: 30%</p> <p>Your letter grade will be determined approximately as follows:</p> <table> <tr> <td>90 or above</td> <td>A</td> </tr> <tr> <td>80 – 89</td> <td>B</td> </tr> <tr> <td>70 – 79</td> <td>C</td> </tr> <tr> <td><69</td> <td>F</td> </tr> </table> <p>(Exact grade cutoff will be determined based on grouping of total numerical grade. + and – will be assigned within each letter grade to further distinguish subgroups.)</p>	90 or above	A	80 – 89	B	70 – 79	C	<69	F
90 or above	A								
80 – 89	B								
70 – 79	C								
<69	F								
Use of portable electronics	Cellular telephones and pagers must be turned off and put away during lectures and exams. Any cellphone use during an exam will be considered grounds for a charge of academic dishonesty. Laptops and tablets may be used, but for class-related activities only.								
eLearning	Slides used in lecture, reading assignments, class announcements, scores, and other course activities will be posted on eLearning, which is accessible through Orion on the UTDallas Homepage.								
Make-up Exams	No make-up exam will be given for absence from an exam other than for official university business or illness (both require either a written university authorization or a physician's statement).								
Extra Credit	Not applicable								

Late Work	Not applicable
Special Assignments	None
Class Attendance	Additional material will be presented in class and, therefore, it would be prudent for students to attend class on time and participate in the lectures and discussions.
Sharing Confidential Information	Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Women's Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an off-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the Title IX Coordinator at 972-883-2218. Additional information and resources may be found at http://www.utdallas.edu/oiec/title-ix/resources .
Technical Support	If you experience any issues with your UT Dallas account, contact the UT Dallas Information Resources Help Desk: assist@utdallas.edu or call 972-883-2911. UT Dallas provides eLearning technical support 24 hours a day/7 days a week. The services include a toll free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service. Please use this link to access the UTD eLearning Support Center: http://www.utdallas.edu/elearninghelp .
Student Conduct and Discipline	<p>The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, <i>A to Z Guide</i>, which is provided to all registered students each academic year.</p> <p>The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the <i>Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3</i>, and in Title V, Rules on Student Services and Activities of the university's <i>Handbook of Operating Procedures</i>. Procedures are defined and described in the Student Discipline and Conduct, UTDSP5003 (http://policy.utdallas.edu/utdsp5003). Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SSB 4.400, 972/883-6391) and online at http://www.utdallas.edu/deanofstudents.</p> <p>A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.</p>
Academic Integrity	The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

	<p>Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.</p> <p>Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.</p>
Copyright Notice	<p>It is the policy of the University of Texas at Dallas to adhere to the requirements of the United States Copyright Law of 1976, as amended, (Title 17, United States Code), including ensuring that the restrictions that apply to the reproduction of software are adhered to and that the bounds of copying permissible under the fair use doctrine are not exceeded. Copying, displaying, reproducing, or distributing copyrighted material may infringe upon the copyright owner's rights. Unauthorized distribution of copyrighted material, including unauthorized peer-to-peer file sharing, may subject students to appropriate disciplinary action as well as civil and criminal penalties. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. For more information about the fair use exemption, see http://copyright.lib.utexas.edu/copypol2.html. As a UT Dallas student, you are required to follow UT Dallas' copyright policy (UTDPP1043 at http://policy.utdallas.edu/utdpp1043) and the UT System's policy at http://www.utsystem.edu/ogc/intellectualproperty/copyrighthome.htm.</p>
Email Use	<p>The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.</p>
Withdrawal from Class	<p>The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.</p>
Student Grievance Procedures	<p>Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's <i>Handbook of Operating Procedures</i>.</p> <p>In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and</p>

	<p>evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.</p> <p>Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.</p>
Incomplete Grades	<p>As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.</p>
Disability Services	<p>The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.</p> <p>The contact information for the Office of Disability Services is: The University of Texas at Dallas, SU 22 PO Box 830688 Richardson, Texas 75083-0688 (972) 883-2098 (voice or TTY)</p> <p>Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.</p> <p>It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.</p>
Religious Holy Days	<p>The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.</p> <p>The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a</p>

	<p>maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.</p> <p>If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.</p>
Off-Campus Instruction and Course Activities	<p>Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at http://www.utdallas.edu/BusinessAffairs/Travel_Risk_Activities.htm. Additional information is available from the office of the school dean.</p>