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| **Course** | **Proteomics: BIOL 6373-001** |
| **Professor** | Hyuntae Yoo |
| **Term** | Fall 2011 |
| **Meetings** | TR 1:00 PM-2:15 PM, FO 3.616 |

## Professor's Contact Information


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| **Office Phone** | 972.883.4128 |
| **Office Location** | BE3.204A |
| **Email Address** | hyuntae.yoo@utdallas.edu |
| **Office Hours** | By Appointment only |


## TA Contact Information


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| **Name** | Pallevi Srivastva |
| **Office Location** | BE3.204C |
| **Email Address** | pallevi.srivastva@utdallas.edu |
| **Office Hours** | Fridays 1 pm – 2 pm (email first to make appointments) |


## 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 MS and PhD students will be lengthier and more rigorous than those for the 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**

*Proteomics for Biological Discovery*. by Veenstra, T.,& Yates, J. (2006).

- Available as eBook in UTD McDermott library

See also the class schedule below.

**Assignments & Academic Calendar**

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

***NOTE: Class readings have been listed within "Topic" boxes. The chapter and corresponding assigned reading are expected to be read PRIOR to that class.***

## LECTURE SCHEDULE

| LECTURE | DATE | TOPIC | CHAPTER |
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| 1 | 25 Aug | Organizational Meeting | |
| 2 | 30 Aug | Review of Protein Structure | |
| 3 | 1 Sep | Proteomics and the New Biology<br>Aebersold and Mann *Nature 422:* 198-207, 2003 | 1 |
| 4 | 6 Sep | From Genomics to Proteomics<br>Tyers et al. *Nature* 422: 193-197, 2003 | N/A |
| 5 | 8 Sep | The Proteome<br>Taylor et al. *Nature Biotech.* 21: 281-286, 2003 | 2 |
| 6 | 13 Sep | Overview of Analytical Proteomics<br>Kakhniashvili et al. *Mol. Cell Prot.* 3:501-509, 2004 | 3 |
| 7 | 15 Sep | Analytical Protein and Peptide Separations<br>Low et al. *Proteom.* 2:1229-1239, 2002 | 4 |
| 8 | 20 Sep | Protein Digestion Techniques<br>Olsen et al. *Mol. Cell Prot.* 3:608-614, 2004 | 5 |
| 9 | 22 Sep | Mass Spectrometers for Protein and Peptide Analysis<br>Anderson et al. *Nature* 433: 77-83, 2005 | 6 |
| 10 | 27 Sep | Protein Identification by Peptide Mass Fingerprinting<br>Baldwin *Mol. Cell Prot.* 3:1-9, 2004 | 7 |
| 11 | 29 Sep | Protein Sequence Analysis by Tandem Mass Spectrometry<br>Medzihradszky et al. *Mol Cell Prot.* 3:429-440, 2004<br>Peng and Gyri *J. Mass Spec.* 36:1083-1091, 2001 | 8 |
| 12 | 4 Oct | Protein identification with Tandem Mass Spectrometry Data<br>Durr et al. *Nature Biotech* 22:985-992, 2004 | 9 |
| 13 | 6 Oct | SALSA: An algorithm for mining specific features of tandem MS data<br>Hansen et al. *Anal. Chem.* 73:1676-1683, 2001 | 10 |
| 14 | 11 Oct | Mining Proteomes<br>Washburn et al. *Nature Biotech.* 19:242-247, 2001 | 11 |
| 15 | 13 Oct | Protein Expression Profiling<br>Han et al. *Nature Biotech* 19: 946-951, 2001 | 12 |
| | 18 Oct | Study Date (No Class) | |
| | 20 Oct | **EXAM 1** | |
| 16 | 25 Oct | Identifying Protein-Protein Interactions and Protein Complexes<br>Blagoev et al. *Nature Biotech* 21: 315-318, 2003 | 13 |
| 17 | 27 Oct | Mapping Protein Modifications<br>Mann and Jensen *Nature Biotech* 21: 255-261, 2003<br>Witze et al. *Nature Methods* 4: 798-806, 2007 | 14 |
| 18 | 1 Nov | New Directions in Proteomics | 15 |

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| | | Pasini et al. *Blood* 108: 791-801, 2006<br>Damon & Aebersold et al. *Science* 312: 212-217, 2006 | |
| 19 | 3 Nov | Protein Chips and Arrays<br>Coleman et al. *Proteom.* 3: 2101-2107, 2003 | N/A |
| 20 | 8 Nov | Quantitative Chemical Proteomics<br>Bantscheff et al. *Nature Biotech* 25: 1035-1044, 2007 | N/A |
| 21 | 10 Nov | The Application of Mass Spectrometry to Membrane Proteins<br>Luche et al. *Proteom.* 3: 249-253, 2003<br>Wu and Yates *Nature Biotech.* 21: 262-267, 2003 | N/A |
| 22 | 15 Nov | Proteomics and Human Disease<br>Kakhniashvili et al. *Exp. Bio. And Med.* 230: 787-792, 2005 | N/A |
| 23 | 17 Nov | Many Roles of Computation in Drug Discovery<br>Jorgensen et al. *Science* 303: 1813-1818, 2004 | N/A |
| 24 | 22 Nov | The Biological Impact of MS-based Proteomics<br>Cravatt et al. *Nature* 450: 991-1000, 2007 | N/A |
| 25 | 29 Nov | Biomedical Informatics for Proteomics<br>Boguski et al. *Nature* 422: 233-237, 2003 | N/A |
| 26 | 1 Dec | The Minimum Information about a Proteomics Experiment<br>Taylor et al. *Nature Biotechnology* 25: 887-893, 2007 | N/A |
| | 6 Dec | Study Date (No Class) | |
| | 8 Dec | **EXAM 2** | |

**Course Policies**

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| **Grading (credit) Criteria** | Students are assessed based on:<br>1. Two exams.<br>2. Participation in class discussions.<br>3. Oral presentations.<br><br>Your numerical grade will be calculated as follows:<br>Exam 1: 35%<br>Exam 2: 35%<br>Oral presentation/Class participation: 30%<br><br>Your letter grade will be determined as follows:<br>90 or above A<br>80 – 89 B<br>70 – 79 C<br><69 F |
| **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 |

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| | discussions. |
| **Student Conduct and Discipline** | 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, *A to Z Guide*, which is provided to all registered students each academic year.<br><br>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 *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. 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 (SU 1.602, 972/883-6391).<br><br>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. |
| **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.<br><br>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.<br><br>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. |
| **Email Use** | 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. |
| **Withdrawal from Class** | The administration of this institution has set deadlines for withdrawal of any college- |

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| | 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. |
| **Student Grievance Procedures** | Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.<br><br>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 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 deal 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.<br><br>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. |
| **Incomplete Grades** | 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**. |
| **Disability Services** | 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.<br><br>The contact information for the Office of Disability Services is:<br>The University of Texas at Dallas, SU 22<br>PO Box 830688<br>Richardson, Texas 75083-0688<br>(972) 883-2098 (voice or TTY)<br><br>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. |

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| | 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. |
| **Religious Holy Days** | 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.<br><br>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 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.<br><br>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. |
| **Off-Campus Instruction and Course Activities** | 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. |

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