Course Description: Biochemical study of proteins (methods of protein purification, principles of protein structure, and the study of proteins as enzymes).

Course Pre-requisites: CHEM 4341.

Course Objectives: To provide students with biochemical background necessary to work in a laboratory environment, which includes both theoretical knowledge and the familiarization with the scientific literature.

General Education Requirements: This course is not part of the general education requirements.

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Office Hours: 8:00-9:00 pm M; 2:00-4:00 pm Tu; 2:30-5:30 pm W. Other times by appointment
Lecture: Section 5341.800; N261; Mondays, 5:00-8:00 pm
Textbook: Required
Bibliography/Reading List: Selected scientific papers related to the topics covered in the course. Students will also have to look for appropriate bibliography to prepare a paper on a biochemical technique that will be assigned by the professor
Web: Additional course materials can be found at the following web address:
http://dhcp60_44.tamuk.edu/BIOCHEM_TAMUK/Courses/Courses.html

This CHEM 5341 Syllabus is intended to be informational and not contractual. The instructor reserves the right to amend or modify the syllabus in any manner that she deems necessary and is in the best interest of Texas A&M University-Kingsville
Policy for Dropping the Course: The last day to officially drop the course with an "automatic Q" is Thursday, March 22 (by 5.00 pm). After March 22, a letter grade of "Q" is recorded if a 60% or above grade has been achieved by the date of the drop; a letter grade of "F" is recorded if this criterion has not been achieved by the date of the drop. The last day to drop or withdraw from the University is Thursday, May 3 (by 5.00 pm). Students will not be dropped for non-attendance, or any other reason, by the instructor. Students must process their own paperwork to drop the course.

---------------- Methods of Evaluation and Grading Procedures ----------------

• Three lecture exams will be administered during the semester (100 points each).

• Two scientific papers will be presented in class by the students. Each student will be assigned a part of each paper to prepare (by performing extensive bibliographical research), critically analyze, present in class (to facilitate its understanding to the rest of the students), discuss with the professor and rest of the students, and evaluate. Each paper presentation has a maximum score of 50 points.

• An individual project will be assigned to each student and collected during Finals Week (100 points). The individual project consists on searching for appropriate bibliography to write a paper describing the use and procedures of a particular biochemical technique (or techniques). Each student will be assigned one or several biochemical techniques by the professor. Instructions on how to write the paper will be provided in class.

• The combined grade will be distributed in points as follows:

<table>
<thead>
<tr>
<th>Point Value</th>
</tr>
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<tbody>
<tr>
<td>Three lecture exams</td>
</tr>
<tr>
<td>Two paper presentations</td>
</tr>
<tr>
<td>Individual Project</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>300 points</td>
</tr>
<tr>
<td>100 points</td>
</tr>
<tr>
<td>100 points</td>
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<tr>
<td>500 points</td>
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</tbody>
</table>

• The final letter grade will be calculated from the student point grade according to the following table:

<table>
<thead>
<tr>
<th>Student point grade</th>
<th>Percentage grade</th>
<th>Letter grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 450 points</td>
<td>≥ 90%</td>
<td>A</td>
</tr>
<tr>
<td>400-449 points</td>
<td>80-89.9%</td>
<td>B</td>
</tr>
<tr>
<td>350-399 points</td>
<td>70-79.9%</td>
<td>C</td>
</tr>
<tr>
<td>300-349 points</td>
<td>60-69.9%</td>
<td>D</td>
</tr>
<tr>
<td>&lt; 300 points</td>
<td>&lt; 60%</td>
<td>F</td>
</tr>
</tbody>
</table>

See the top of this page for policy on obtaining a Q grade in the course.
Lecture Rules and Information

- Successful performance in this class and a comprehensive understanding of the principles of CHEM 5341: Biochemical Analysis of Proteins course require class attendance. Excused absences need to be reported, at the latest, on the previous class meeting day.

- Examinations are indicated in the schedule. No make-ups are offered for the exams (under any circumstances). Each partial exam will be graded on a 100 points basis. Late assignments will be marked down (up to 50% for each day they are late).

- Graded exams and individual projects will be available to students for review; however, they will be kept for the instructor’s records.

- An attempt of cheating will result in an automatic zero for the examination. A repeated cheating offense will result in expulsion from the course (please see information about academic misconduct in the section entitled Other Important Information). Books, notebooks, cell phones, etc. need to be placed in a specific area of the classroom during examinations. Bathroom brakes are not permitted during examinations.

- Questions are encouraged during class. No smoking or eating is allowed during lecture. Students must turn off their cell phones during all class meetings (including, of course, examinations). Calculators and writing implements may be used in the exams, but not shared.

- Students with disabilities, including learning disabilities, who wish to request accommodations in this class should notify the Services for Students with Disabilities (SSD) Office early in the semester so that the appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of his/her disability to the SSD coordinator (see corresponding pages of the Student Handbook).

Student Learner Outcomes

At the successful completion of this course, you will

1. Have acquired knowledge and comprehension in the field of biochemistry, and be able to describe and discuss in scientific essays matters related to this knowledge: amino acids that constitute proteins, techniques of protein purification (fractional precipitation techniques, chromatographic separations, electrophoresis and ultracentrifugation), the four levels of protein structure, protein primary structure determination, chemical evolution of proteins, protein secondary structure, tertiary structure of proteins, forces that stabilize protein structure, characteristics of enzyme-catalyzed reactions, etc.

2. Demonstrate practical ability in applying the knowledge of biochemistry acquired to interpret and analyze problems, and devise and formulate solutions.

3. Demonstrate familiarization with the scientific literature, both technical and experimental, related to the biochemical topics covered in the course. You will exhibit the ability to research scientific literature, and critically analyze, present in a seminar, discuss and evaluate research performed utilizing proteins. Additionally, you will demonstrate skill to analyze, collect, synthesize, organize, and write scientific information related to a particular topic of protein research.

Assessment of learner outcomes: The assessment lecture exams, scientific seminars, and individual project shown in the schedule will be analyzed to assess the student performance in the three areas described above. Reports with the percentages of students that achieve the desired outcomes to
acceptable and outstanding levels will be generated. Improvement procedures will be implemented to reach high levels of student learning.

--------------------------- Other Important Information ---------------------------

- **Academic misconduct** (see the Student Handbook for further details): Students are expected to practice academic honesty in every aspect of this course and all other courses. Students must be familiar with the Student Handbook, particularly the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

  **Forms of academic dishonesty:**
  1. Cheating: deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations.
  2. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.
  3. Fabrication: use of invented information or falsified research.
  4. Plagiarism: unacknowledged quotation and/or paraphrase of someone else’s words, ideas, or data as one’s own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one’s own work also constitutes plagiarism.

- **Non-academic misconduct** (see the Student Handbook for further details): The University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferers with either (1) the instructor’s ability to conduct the class, (2) the ability of other students to profit from the instructional program, or (3) the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated to the Dean of Students under nonacademic procedures.

- **Sexual misconduct** (see the Student Handbook for further details): Sexual harassment of students and employees at Texas A&M University-Kingsville is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.
Lecture Outline and Exam Schedule

AMINO ACIDS OF PROTEINS AND TECHNIQUES OF PROTEIN PURIFICATION

1. Amino acids and the peptidic bond
2. Initial considerations in protein purification procedures, and fractional precipitation techniques
3. Chromatographic separations
4. Electrophoresis and ultracentrifugation

Assessment Paper Presentation 1 (50 points): Research Paper Related to Sections 1 through 4
Assessment Lecture Exam 1 (100 points): Sections 1 through 4

COVALENT STRUCTURES OF PROTEINS AND PROTEIN SECONDARY STRUCTURE

5. The four levels of protein structure
6. Protein primary structure determination
7. Chemical evolution of proteins
8. Protein secondary structure

Assessment Lecture Exam 2 (100 points): Sections 5 through 8

GLOBULAR PROTEINS AND PROTEINS AS ENZYMES

9. Tertiary structure of proteins
10. Protein stability
11. Characteristics of enzyme-catalyzed reactions, and enzyme kinetics
12. Enzyme inhibition and regulation of enzymatic activity

Assessment Paper Presentation 2 (50 points): Research Paper Related to Sections 9 through 12
Assessment Lecture Exam 3 (100 points): Sections 9 through 12
Assessment Individual Project (100 points) due during Finals Week

Each one of the sections (1 through 12) that are included in this outline is covered in approximately one-week period. The specific dates for each one of these exams and paper presentations, as well as for the individual project, will be announced in class.