FAU

FLORIDA ATLANTIC UNIVERSITY

COURSE CHANGE REQUEST
Undergraduate Programs

Department Chemistry and Biochemistry

College Science

UUPC Approval 4/24/23
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

***Current* Course Prefix and Number**	BCH 4035	***Current* Course Title**	Advanced Biochemistry

Syllabus must be attached for ANY changes to current course details. See Checklist. Please consult and list departments that may be affected by the changes; attach documentation.

Change title to:
RI Advanced Biochemistry

Change prefix
From: **To:**

Change course number
From: **To:**

Change credits*
From: **To:**

Change grading
From: **To:**

Change WAC/Gordon Rule status**
Add ☐ **Remove** ☐

Change General Education Requirements***
Add ☐ **Remove** ☐

*Review Provost Memorandum
**WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to this form. See WAC Guidelines.
***General Education criteria must be indicated in syllabus and approval attached to this form. See GE Guidelines.

Change description to:
Topics will cover the structure and function of proteins and their biotechnological, medical and scientific use. In addition, students will be assigned research topic assignments that that will facilitate understanding and practical application of research methods used in protein chemistry.

Change prerequisites/minimum grades to:

Change corequisites to:

Change registration controls to:

Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade (default is D-).

Effective Term/Year for Changes:	Spring 2023	**Terminate course? Effective Term/Year for Termination:**	

Faculty Contact/Email/Phone Mare Cudic/mcudic@fau.edu/561-297-4645

Approved by		***Date***
Department Chair	Andrew Terentis	3/30/23
College Curriculum Chair		4-5-23
College Dean		4/5/23
UUPC Chair	Ethlyn Williams	4/24/23
Undergraduate Studies Dean	Dan Mecroff	4/24/23
UFS President		
Provost		

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

SYLLABUS **BCH 4035: RI ADVANCED BIOCHEMISTRY** **FALL 20XX**
3 credit hours
Florida Atlantic University
Department of Chemistry and Biochemistry

COURSE: Location: In person, TBD
Time: TR 9:30 AM – 10:50 AM
Duration: Fall semester

INSTRUCTOR: Dr. Mare Cudic
Office: SE-134
Email: mcudic@fau.edu
Phone: 561-297-4645
Office hours: Tuesday 1:00-2:00 pm, and by appointment (Zoom)

INSTRUCTIONAL METHOD
This course is taught in person. Students are expected to cover the material as described in the course syllabus. Slide presentations and related material will be posted in Canvas.

COURSE WEB-SITE
The Canvas site for this course, where students can obtain course information, can be reached using the address http://canvas.fau.edu. Your username is the same as your FAUNET ID. It is the student's responsibility to read the entire syllabus and understand the contents herein. This syllabus forms the rules and regulations by which you must abide. In addition, it is the student's responsibility to monitor, read and understand all emails and announcements and course documents that are posted on the course Canvas site. Any corrections or additions to the syllabus will be posted at the course Canvas site and are understood to be part of the syllabus.

PREREQUISITE
Students must have completed undergraduate level BCH 3033 with a minimum grade of C before taking this course.

COURSE DESCRIPTION
Topics will cover the structure and function of proteins and their biotechnological, medical and scientific use. In addition, students will be assigned research topic assignments that will facilitate understanding and practical application of research methods used in protein chemistry.

This RI course is a comprehensive study of proteins and their importance within biological systems. All aspects of the research process: development of a research question, and the methods and/or experimental procedures to study that question, how to conduct scientific experiments, data analysis and interpretation, including scientific technical writing and oral presentation.

NOTE OF RESEARCH INTENSIVE (RI) COURSE DISTINCTION:
This course contains an assignment or multiple assignments designed to help students conduct research and inquiry at an intensive level. If this class is selected to participate in the university-wide assessment program, students will be asked to complete a consent form and submit electronically some of their research assignments for review. Visit the Office of Undergraduate Research and Inquiry (OURI) for additional opportunities and information at http://www.fau.edu/ouri.

COURSE OBJECTIVES
The main objective of this course is to provide an in-depth understanding of the relationship between the structure and function of biological macromolecules such as proteins. Different strategies and methods for the production, isolation, structure determination, and modification of proteins will be covered. In addition, an overview of the main group of proteins (enzymes, membrane proteins, structural proteins, regulatory proteins) and their function, including enzyme catalysis and kinetic and thermodynamic characterization of protein-ligand interactions will be presented. The practical applications will be further explored through in-class student presentations from recent literature highlighting the current advances in the field. Upon completion of this course, students are expected to have a good understanding of the factors affecting protein functions, methods to determine the basic physicochemical and functional properties of proteins, and the ability to describe how proteins can be used for

production and development of drugs, for biotechnological and other industrial and scientific purposes. These are necessary tools for successful involvement of undergraduate students in the areas of biological sciences.

STUDENT LEARNING OUTCOMES (SLO)

SLO 1: Knowledge.

Students will demonstrate the ability to use protein databases to determine protein properties, target those properties (solubility, size, charge, adsorption characteristics, and biological affinities) to purify individual proteins from complex mixtures and/or identify proper functional assay, complete literature search, write a summary report and prepare oral presentation at the end of the course.

SLO 2: Formulate Questions.

Students will formulate or identify research questions and evaluate the literature to integrate basic principles and knowledge of protein chemistry and their application.

SLO 3: Plan of Action.

Students will develop and implement an experimental approach to address research and inquiry questions or scholarly problems. Students' plan of action will be evaluated in the written assignment.

SLO 4: Critical Thinking.

Students will apply critical thinking skills to evaluate available information through literature search regarding the practical application of protein purification and structural characterization methods and/or biological functional assay.

SLO 5: Ethical Conduct.

Students will identify and follow ethical guidelines while conducting research and inquiry.

SLO 6: Communication.

Students will convey their research and inquiry in both oral and written formats.

COURSE TEXTBOOKS

There is no required text. You should have a good undergraduate Biochemistry text (Lehninger, Stryer, etc.).
Recommended textbooks:

1. "Proteins: Structure and Function", David Whitford, 2005, John Wiley & Sons, Ltd, ISBN:978-0-471-49894-0
2. "Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis", Robert A. Copeland, 2nd ed. (2000), Wiley-VCH, ISBN-13 978-0471359296
3. "Introduction to macromolecular binding equilibria", Charles P. Woodbury, 1st ed. (2007), CRC Press, ISBN-13: 978-1420052985
4. "Essentials of glycobiology", Ajit Varki, Richard D. Cummings, Jeffrey D. Esko, Pamela Stanley, Gerald W. Hart, Markus Aebi, Debra Mohnen, Taroh Kinoshita, Nicolle H. Packer, James H. Prestegard, Ronald L. Schnaar, and Peter H. Seeberger. 4nd ed. (2022), Cold Spring Harbor Laboratory Press, ISBN-13: 978-1-621824-21-3 (hardback) ISBN-13: 978-1-621824-22-0 (epub)
   Free online viewing at https://www.ncbi.nlm.nih.gov/books/NBK579918/.

TOPICS TO BE COVERED (dates are subject to change)

1. Course overview and review of basic protein biochemistry

Class dates: Aug 23rd

2. Amino acids: The building blocks of proteins/Peptide bond formation and peptide synthesis

Class dates: Aug 25th, *Aug* 30th

3. Protein composition and structure

Class dates: Sept 1st, *Sept* 6th

4. Review session

Class date: Sept 8th

5. Synthesis and purification of proteins

Class dates: Sept 13th, Sept 15th, Sept 20th

6. Protein assays

Class dates: Sept 22nd, Sept 27th

7. Review session

Class date: Sept 29th

8. Protein structure determination

Class dates: *Oct 6th, Oct 11th*, Oct 13th

9. Student research topic presentations

Class dates: Oct 18th, Oct 20th
10. Post-translational protein modifications and their functional role
Class dates: Oct 25th, *Oct* 27th, *Nov 1st*
11. Enzyme catalysis
Class dates: Nov 3rd, Nov 8th, Nov 10th
12. Review session
Class date: Nov 15th
13. Student presentations
Class dates: Nov 22nd, Nov 29th, Dec 1s
This tentative outline of the course content is subject to change depending on the progress of the class.

RESEARCH ASSIGNMENTS

1. Explore the protein data bases, the UniProt Knowledgebase (UniProtKB) and Protein Data Bank (PDB) to determine protein sequence, physical and chemical parameters, secondary structure, gene(s) that code for the protein sequence(s), structure (X-ray), and posttranslational modifications for the assigned protein.
2. Design the best purification method for the mixture of proteins given and including your assigned protein.
3. Explore one method that can be used to purify or characterize the assigned protein or one example of the functional assay for that protein.
4. Identify one recently published paper that used the method you studied above for your assigned protein. Describe the details of the experimental protocol and results obtained.
5. Prepare the PowerPoint for the oral presentation on the same topic.

INTEGRATION OF SLO's AND ASSIGNMENTS

SLOs	*Assignment requirements and assessments*
1. Knowledge	Students will master research methodologies. Students will master use of the protein database to retrieve experimentally determined information about the protein, including sequence, structure and biological function. These databases provide access and tools for exploration, visualization, and analysis of proteins. Students will learn to integrate knowledge into practice, evaluate experimental approaches, analyze and describe results clearly and effectively, write concise summaries of research findings and reference literature. Requires students to be effective performers with acquired knowledge - by changing the parameters or rules in the simulated environment the students are given the opportunity to develop and test their models and adapt successful ones to new situations. This is significantly more effective than asking multiple choice questions after the fact.
2. Formulate Questions	Students will formulate a fundamental research question that will be addressed in their assignment. Also, students should conduct background research to determine what work has been done to address this question and confirm that research is unique. The ability to identify a key critical question applicable to the selected field of study will be assessed.
3. Plan of Action	Students will develop and implement a statement of intent outlining the significance of the project, literature review, state hypothesis, specify the experimental design that will be implemented, potential difficulties and limitations of the proposed methods, and alternative approaches. The timeline of the proposed studies will be evaluated by the student's thesis committee.
4. Critical Thinking	Specifically, critical review of chemistry methods applied, ability to recognize and explain experiments efficiently, report data and make most relevant conclusions out of experimental results will be assessed both during oral presentations and in evaluating written reports.
5. Ethical Conduct	Students will evaluate if the published results follow the ethical guidelines regarding the human and animal subjects and use of cell lines. In addition, the data sharing plan will be discussed.
6. Communication	Students will convey their research and inquiry in both oral and written formats. As part of the written report, students will be required to write a summary of the research

	method related to protein purification, characterization or functional assay. These reports are expected to demonstrate proficiency in technical writing and the ability to present all relevant information. Students will also be assessed for the quality of oral communication skills during the topic presentation. Content and its organization, clarity, delivery and quality of the power points will be part of the grading rubric.

EXAMS

There will be three major exams during the semester: two progress exams (non-cumulative) and a comprehensive final exam. The comprehensive final exam is cumulative and may test any topic covered during the semester. The comprehensive final will be given during exam week at the end of the semester in accordance with the published FAU exam schedule. Each progress exam will be 80 minutes while the final exam will be 120 minutes in duration. The exams will test material covered in classes as well as assigned readings and homework. The exam dates are as follows:

Exam 1: Tuesday, Oct 4th, 9:30-10:50 AM

Exam 2: Thursday, Nov 17th, 9:30-10:50 AM

Final Exam: Thursday, Dec 8th, 8:00-10:00 AM

A student who misses a test during the semester or the final exam will receive a grade of 0 unless a) the student notifies the instructor prior to the exam that he or she will be absent and b) the student presents a legitimate, documented reason that meets FAU criteria for missing the exam. If these conditions are met, a make-up exam will be considered. All make-up exams must be taken before the final exam.

Any dispute concerning exam grades during the semester must be brought to the attention of the instructor within one week after exams are returned to the class. No appeal will be entertained at later dates.

ASSESMENT AND GRADING SCALE

The course grade will be based on two progress exams (15 points each), final exam (30 points), and research assignment (40 points). The grade will be calculated as a percentage of the total points earned, 100 for undergraduate and 120 for graduate and honors students, respectively.

The "A" range is 93-100%, "A^-" range is 90-92, "B^+" range 87-89%, "B" range 83-86%, "B^-" range 80-82%, "C^+" range 77-79%, "C" range 73-76%, "C" range 70-72%, "D^+" range 67-69%, "D" range 63-66%, "D^-" range 60-62%, and "F" below 60%. The plus/minus grades may be given.

INCOMPLETE GRADE

Incomplete will not be given unless a) a student is passing the course and b) a student encounters severe and unexpected problems and was not able to complete some portion of the work assigned to all students as a regular part of the course. Incompletes are given only by arrangement with the instructor. Students are expected to make up incompletes as soon as reasonably possible. Incompletes are not given because a student is doing poorly in the course.

CREDIT HOUR DEFINITION

This course involves a minimum of one hour of classroom instruction for each credit hour per week, and a minimum of two hours of out of class assignments each week for 15 weeks.

CLASSROOM ETIQUETTE POLICY

In order to enhance and maintain a productive atmosphere for education, it is everyone's responsibility to make wise choices and take responsibility for their actions.

Policy on the Recording of Lectures

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

CLASSROOM ATTENDANCE POLICY

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in university-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances, and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a university-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

DISABILITY POLICY STATEMENT

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS) CENTER

Life as a university student can be challenging physically, mentally, and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students with a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/.

CODE OF ACADEMIC INTEGRITY POLICY STATEMENT

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university's mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.