

B - Course Revision Form V. 7.2022 : Entry # 3226**DEAN Decision**

Approved

Today's Date

01/31/2024

EPC Decision

Approved

Today's Date

04/04/2024

GEC Decision

Approved

Today's Date

04/25/2024

APIRC Decision

Approved

Today's Date

05/07/2024

Begin Form**Today's Date**

01/26/2024

Your Name

Kelsey Kean

Your Email:kkean1@highpoint.edu**Are you a Department Chair?**

No

Department Chair Name

Todd Knippenberg

Email address of your Department Chair

B - Course Revision Form V. 7.2022 : Entry # 3226mknippen@highpoint.edu

By checking below, I certify that my department chair has seen and approved the course revisions that are in this proposal

Yes

Please select the appropriate school overseeing this proposal:

Natural Sciences

Which semester is this course to be taught as proposed?

Spring 2025

Are you submitting multiple courses for revision from the same department?

Yes

Please list all of the courses that you are submitting revisions for:

Course Prefix	Course Number	Course Title
BCH	4881	Special Topics

What would you like to revise?

- Special Topics Course

Are you also revising any of the following for this course?

- Change course designator
- Change course title
- Change course description

Gen Ed & Academic Program Information

Is this a revision to meet new Gen Ed requirements?

Yes

Which area(s) of Gen Ed does your proposal seek for approval?

- Experiential Learning [EXP]

Is this course part of an academic program?

- This course does not currently fulfill academic program requirements

Does this course, as revised, include any community engagement?

No

B - Course Revision Form V. 7.2022 : Entry # 3226**Is this course part of GoGlobal?**

No

Does this course count towards a major or a minor?

Yes

Please list the course(s) and whether they are required or electives for the major/minor.

Course Prefix/Number	Name of Major and/or Minor?	Required or Elective?
BCH	4881	Required

Is this course cross listed?

No

Choose the department designator for your course from the list below.

Special Topics**Special topics course title**

A) BCH 4111: Biochemistry of Gene Expression B) BCH 4112: The Wonderful World of Proteins

Special topics course description

A) This course is a combined lecture/laboratory course that will encompass advanced topics and modern experimental techniques related to the biochemistry of gene expression. Topics will include transcription, RNA processing, translation, genome engineering, and gene therapy. Laboratory experiences will be primarily inquiry-based and include training in both prokaryotic and eukaryotic gene expression analysis, as well as cell culture, molecular cloning, high throughput sequencing, and the application of bioinformatic tools to the study of gene expression.

B) Proteins are not just strings of letters, but real physical objects that are the machines that do the majority of the work in all life forms. This course will provide you with an in-depth understanding of proteins, their properties and their structure that will powerfully inform your understanding of life at the molecular level. Additionally, this course will provide hands-on experiences in key biochemical techniques include recombinant protein expression, affinity chromatography, and activity assays.

Please list any prerequisites for this special topics course

BCH 3010 or BCH 3510

List the special topics student learning outcomes

- A) BCH 4111: Biochemistry of Gene Expression
- By the end of this course, students should be able to:
1. Apply previously learned concepts from biochemistry
 2. Describe the processes of transcription, processing, and translation
 3. Display proficiency in mammalian cell culture techniques
 4. Display proficiency in purifying RNA from mammalian cell culture
 5. Implement a reporter assay to analyze gene expression
 6. Apply RT-qPCR to quantify mRNA levels

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7. Evaluate new technologies and bioinformatic tools that are currently being used to study the transcriptome
8. Apply CRISPR technology to edit DNA
9. Explain different uses of nucleic acids as therapeutic molecules
10. Think critically about experimental evidence

B) BCH 4112: The Wonderful World of Proteins

By the end of this course, you should be able to:

1. Apply previously learned concepts from both general chemistry and biology to new concepts.
2. Knowledgeably describe, identify, and make inferences about the 20 amino acid residues.
3. Apply a solid foundational understanding of the principles of protein structure.
4. Understand how selective pressures work at the level of protein structure and the kinds of changes in proteins that take place over time.
5. Use Pymol to inspect and manipulate 3D structures stored in PDB format.
6. Critically evaluate the logic and supporting data for a given hypothesis.
7. Interpret data from experiments and controls.
8. Troubleshoot experiments that do not work.
9. Keep a detailed and organized laboratory notebook.
10. Think critically about experimental evidence and critically discuss literature in this field.
11. Communicate and share knowledge about protein structure and function.

Rationale for special topics course

A) BCH 4111 (Biochemistry of Gene Expression) is a major elective course in the B.S. Biochemistry curriculum. This course has been offered 3 times under BCH 4881 (Special Topics).

B) BCH 4112 (The Wonderful World of Proteins) is also a major elective course in the B.S. Biochemistry curriculum and has been offered once under BCH 4881 (Special Topics).

When each was originally created, it was part of an overall effort to revise the biochemistry curriculum to achieve two goals: 1) create a modern biochemistry curriculum, consistent with what employers and graduate and professional schools are expecting, keeping pace with quickly advancing scientific techniques and 2) create a few upper-level electives for students to choose from to better customize their degree to their interests and future goals. These efforts were approved by APIRC when the curriculum was modified in 2014. This was after consulting with PhD programs in biochemistry and BS programs at peer and aspirant institutions.

We plan to offer these courses consistently to juniors and seniors as two upper-level, laboratory-intensive electives. Students will have the option to take the nucleic acids-focused course (Biochemistry of Gene Expression) and/or the protein-focused course (The Wonderful World of Proteins) depending on their interests. In this way, they will become a part of a regular offering of upper-level electives critical for educating our majors in modern biochemical topics. Specifically, the learning outcomes that stem from the study of gene expression and protein biochemistry are fundamental for our graduates as they complete a biochemistry degree. Additionally, the lecture content and hands-on laboratory experiences have been purposefully designed to prepare our students as they embark on graduate school, professional school, and research journeys. The proposed course revisions both build on fundamental biochemistry principles and laboratory techniques in the prerequisite course: BCH 3010 or BCH 3510 (Biochemistry I). The proposed courses connect to other content at the 3000-level in BCH 3520 (Biochemistry II) and BCH 3511 (Biochemistry laboratory). There is no significantly overlapping course within the Wanek School of Natural Sciences or the Chemistry Department.

Please describe how this special topics course fulfills any major requirements

Students completing a B.S. Biochemistry degree are currently required to take one 4 credit Special Topics (BCH 4881) course. By revising the course to either BCH 4111 or 4112, the credit requirements and therefore total credits in the major do not change. Students from outside the degree are also able to enroll, provided they have successfully completed the prerequisite courses (BCH 3010 or BCH 3510).

Curriculum Review Information

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- [Gene-Expression-sample-syllabus.pdf](#)

Additional Files

- [Proteins-Sample-Syllabus.pdf](#)