

**New Undergraduate Program (Majors, Minors, Sequences) Proposal
Illinois State University - University Curriculum Committee**

Program Department Physics

Initiator David Marx

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Initiator Department Physics

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Title of New Program Biophysics Sequence

Submission Date Friday, November 12, 2021

Email dtmarx@ilstu.edu

Campus Address 4560 Physics

Version 6 **ID** 243

Proposed Starting Catalog Year 2022-2023

Associated Course Proposal(s):

New Course proposal PHY 202 titled *Introduction to Biophysics*

New Course proposal PHY 371 titled *BIOPHYSICS OF NEUROLOGICAL SYSTEMS*

Delete Course proposal PHY 380.8 titled *Topics in Contemporary Physics: Biophysics of Neurological S*

1. Proposed Action

New Major

New Minor

✓ New Sequence

More than 50% of courses in this program are Distance Education

Sequence Major

Physics

2. Provide Undergraduate Catalog copy for new program.

Major in Physics (B.S.)

Biophysics Sequence

Major Requirements

Minimum required credit hours: 91 (39 credit hours in PHY required)

- PHY 107
- PHY 110
- PHY 111
- PHY 112
- PHY 202
- PHY 217
- PHY 220
- PHY 240
- PHY 270
- PHY 284
- PHY 371
- BSC 196
- BSC 197
- BSC 203
- BSC 343
- BSC 350
- CHE 110/CHE 112
- CHE 220
- CHE 242
- MAT 145
- MAT 146
- MAT 147
- MAT 175
- MAT 340

Take 1 of the following courses:

- BSC 283
- BSC 219

Take 1 of the following courses:

- PHY 340
- PHY 384

3 hours of 300-level Physics electives

Notes:

Students completing this major in 8 semesters must initially place into MAT 145. Placing below MAT 145 will extend time to degree completion.

3. Provide a description for the proposed program.

Biophysics is an interdisciplinary sequence within the Physics major in which students combine a strong foundation in physics (39 CR) with courses in biology (20 CR) and chemistry (13 CR) along with 2 specialized biophysics courses (6 CR). The sequence should appeal to students interested in physics and mathematics who want to pursue careers in biology, biomedicine, medicine and bioengineering.

4. Provide a rationale of proposed program.

Biophysics has become a well-established, interdisciplinary sub-field of physics. The Physics Department has had faculty working in this area for several years and there has been increasing interest from students to pursue this discipline for their future careers in physics, biology, or medicine.

5. Describe the expected effects of the proposed program on existing campus programs (if applicable).

In discussions with the Biological Sciences, Mathematics, and Chemistry Departments, we find that for the numbers of expected students in the new sequence, there should be little effect on courses in those programs.

6. Provide a sample four-year plan of study that fulfills the following requirements: 120 hours, 42 senior college hours (200 and 300 level courses), and 39 General Education Program hours or 36 hours with exemption. If the program is a BS program, show the BS-SMT degree requirement. If the program is from CAS, show Foreign Language Requirement (LAN 111/LAN 112). Confirm General Education requirement exemptions on the General Education page of the current Academic Catalog. *4-year plans are not required for minor program proposals.*

Please see the attached four-year plan of study.

Physics majors are exempt from the SMT Gen. Ed. requirement due to disciplinary expertise gained in the major.

The mathematics gen. ed. requirement is met with MAT 145 and the Natural Science/Natural Science Alternatives is satisfied using PHY 110 and BSC 196.

The 8 credit-hour foreign language requirement for CAS is included in the 4 year plan of study. Students that satisfy the requirement before coming to ISU will be advised to take additional courses in PHY or BSC or other senior electives for those 8 credit hours.

Sample plan of study:

First Year - Fall Semester (16 credit hours)

MAT 145 (General Education) (4)

PHY 110 (General Education) (4)

PHY 107 (1)

ENG 101 or COM 110 (General Education) (3)

BSC 196 (General Education course) (4)

First Year - Spring Semester (15 credit hours)

MAT 146 (General Education) (4)

PHY 111 (4)

BSC 197 (4)

ENG 101 or COM 110 (General Education) (3)

Second Year - Fall Semester (16 credit hours)

MAT 147 (4)

PHY 112 (4)

CHE 110/112 (5)

General Education course (3)

Second Year - Spring Semester (15 credit hours)

PHY 217 (3)

CHE 220 (5)

MAT 175 (4)

General Education course (3)

Third Year - Fall Semester (15 credit hours)

PHY 220 (3)

PHY 240 (3)

BSC 203 (3)

CHE 242 (3)

General Education course (3)

Third Year - Spring Semester (14 credit hours)

PHY 202 (3)

PHY 270 (2)

PHY 284 (3)

BSC 283 (3)

General Education course (3)

Fourth Year - Fall Semester (13 credit hours)

PHY/BSC 371 (3)

MAT 340 (3)

BSC 350 (3)

University-wide elective (1)

General Education AMALI course (3)

Fourth Year - Spring Semester (16 credit hours)

PHY 340 (3)

BSC 343 (3)

Senior-level Physics Elective (3)

Foreign language 112-level (4)

General Education course (3)

7. Describe the expected curricular changes required, including new courses. If proposals for new courses have also been submitted, please reference those related proposals here:

Two new courses have already been approved, PHY 202 and 371. PHY 371 has been offered several times and has attracted many students with each offering.

8. Anticipated funding needs and source of funds.

The degree sequence requires the teaching of PHY 202: Intro. to Biophysics course and PHY 371. The PHY 202 will likely be initially taught by an NTT faculty member or faculty from BSC, while PHY 371 will be taught by Professors Epa Rosa (PHY) and Wolfgang Stein (BSC). If a new faculty hire happens to be a biophysicist, then the NTT faculty would no longer be needed.

There are 5 or 6 important books/textbooks in biophysics that our library should purchase in support of the program. These would be an approximate cost of \$700.

9. No Does this program count for teacher education?

10. No Is this an Interdisciplinary Studies program?

11. The following questions must be answered.

Yes Have you confirmed that Milner Library has sufficient resources for the proposed program?

No Are more than 120 hours required to complete a degree with this major?

Yes Beyond General Education, does the major require more than 66 semester hours?

Rationale for mandating over 66 hours in the major. [Required Hours Policy](#)

The additional courses are in biological sciences and chemistry in support of the interdisciplinary nature of the biophysics sequence.

No Does this sequence (if in a major) require more than 55 semester hours of courses in the major department/school?

Yes Does this program stipulate specific general education courses offered in the major department/school as a part of the major requirements only if such courses serve as prerequisites for other courses required by the major?

Explain why specific general education courses are required.

BSC 196 is a natural science alternative gen ed course that is a pre-req for three subsequent courses in the degree sequence.

No Does this program stipulate specific course requirements (majors/sequences only) that also satisfy general education and/or IAI requirements?

No Is the proposed program intended to be longer than four years (as indicated by the plan of study)?

Yes Have letter(s) of concurrence from affected departments/schools been obtained?
A departments/school is affected if it has a program with significant overlap or if it teaches a required or elective course in the program.

12. Routing and action summary for New Program:

1. Physics Department Curriculum Committee Chair

David Marx (website)

Signature

David Marx

Print

10/16/2021 5:28:58 PM

Date

2. Physics Department Chair/School Director

Lisa Szczepura (website)

Signature

Lisa Szczepura

Print

10/19/2021 8:35:14 AM

Date

3. College of Arts & Science College Curriculum Committee Chair

Todd Stewart (website)

Signature

Todd Stewart

Print

11/17/2021 10:16:51

Date

4. College of Arts & Science College Dean

Rocio Rivadeneyra (website)

Signature

Rocio Rivadeneyra

Print

11/17/2021 11:08:53

Date

5. University Curriculum Committee Chair

Mary Califf (website)

Signature

Mary Califf

Print

1/20/2022 4:23:56 PM

All new programs (majors, minors, sequences) are routed by the U.C.C. to the Academic Senate

Comments

Comments from Version 1 from Todd Stewart (College Curriculum Committee Chair):

Hi. We voted that this proposal should be revised and resubmitted. Here are the issues we identified. (1) We think that BSC 196 should be included somewhere in the catalog copy. BSC is effectively a hidden prereq for three other required courses in the current proposal, and being explicit about such things is helpful to students and advisors. One option would be just to add BSC 196 to the list of required courses and to adjust the required hours up accordingly. Or, BSC 196 could be listed as a required general education course for the sequence in the catalog. If you handle it this way, then you would need to change the appropriate answer to one of the questions under 11. (2) PHY 372 is not in the system anywhere that we can find but is a required course. Either it needs to be removed as a requirement or we need an associated proposal to create PHY 372. (3) We also think that the proposed copy could be clearer. "Required courses: PHY 107, 110, 111, 112, 202, 217, 220, 240, 270, 284, 307, 325, 340, 371 or 372" is ambiguous. The scope of the "or" is the problem. This could be read as: take one of any of the following courses. We think you mean: Required courses: PHY 107, 110, 111, 112, 202, 217, 220, 240, 270, 284, 307, 325, 340; 371 or 372. Adding a semi-colon would restrict the "or" to just 371 and 273. (4) Related to (1) and BSC 196, if you do add BSC 196 as a requirement and total required hours go up, we think you'll need a new financial implications form reflecting this change. Thanks, and please contact me with any questions you have about this, Todd Stewart, Chair, CAS CC

Comments from Version 2 from Todd Stewart (College Curriculum Committee Chair):

Hi. Below are comments from our subcommittee about the revised biophysics proposal. Note that since it seems that PHY 371 will be cross-listed as BSC 371, we also need an associated proposal to create BSC 371 (or to revise an older biology course into BSC 371). We'd encourage a chair or representative of the physics department to attend the next meeting where we discuss this proposal. This could be after you resubmit a proposal or before you do so, seeking clarification from us. We have very little business at the moment, so it isn't clear when we will next meet, but we normally meet on Tuesdays from 1-2PM. We could schedule a meeting just to talk with you about this, since we too would like to get this proposal approved.

Here are the subcommittee comments:

1. The hours don't add up. I count 122 total without the "elective".
2. The math classes are de facto required, and should be listed as required courses.
3. Point 2 means a letter from Mathematics is needed. Even if it isn't listed, these students will require seats in MAT courses.
4. They really need a rationale (what they have now isn't one) for why the major is over 66 hours, and the MAT hours need to be included as well
5. I am extremely uncomfortable with the idea that students in this program might be exempted from BSC 196 in a future proposal, and that they might be overridden into other BSC courses that have 196 as a prerequisite by physics advisors. Physics advisors should not be giving overrides into Biological Sciences courses for lack of prerequisites without explicit permission from BSC. I have personal experience with Physics overriding students into one of my lecture courses because the student was enrolled in a physics course that met at the same time without asking or informing me. At the very least, a letter from BSC would be needed giving explicit permission for this arrangement, and even then I have concerns.

Comments from Version 3 from Todd Stewart (College Curriculum Committee Chair):

Hi. We voted that this proposal should be revised and resubmitted. We do think it will be a wonderful additional, and look forward to approving it. But, important details need to be ironed out. (1) The copy says that 43 hours of PHY courses are required. But, when we add the required course up, we get 46 hours of PHY courses. (2) The copy says 82 hours are required. But, when we add 46 PHY + 13 CHE + 20 BSC, this comes to 79 total hours. So, the numbers in the copy do not seem to add up properly. Please sort all of this out and double-check the math. (3) We see that MAT 145, 146, 147, 175, and 340 are all hidden prereqs for various science courses. We will not require you to add all of these as explicit requirements affecting the total number of required hours. But we do think that students should be alerted to the fact that they will need to take all of these MAT courses, so they can plan to take them in a timely manner. So, we think you should add something to the proposed copy reflecting this, perhaps like:

Note: MAT 145, 146, 147, 175, and 340 are prerequisites for some of the courses required by this program.

(4) Connected with this, we think a letter of non-objection from the mathematics dept. is needed to ensure that they are aware that they may have to handle some number of biophysics students in all of these courses, especially in MAT 340. An email from the chair appended as part of the supporting document would be sufficient. (5) There are some minor problems in the proposed plan of study. The sample plan of study says students will take PHY 340 or 384, but the copy requires 340. The plan also says students will take BSC 219 or 283. But the copy requires 219. And, in general, don't list specific PHY electives. Just say: PHY elective 3 hours. (6) Under question 11, no rationale/clear justification is offered for why the program *as a whole* is over 122. It could be that, e.g., all the required courses are necessary so that students can attain the proper level of competency in the field, etc. But in general, please provide more informative answers to all the subquestions asked under 11. Thanks, Todd Stewart, Chair, CAS CC

Comments from Version 4 from David Marx (Physics Department Curriculum Committee Chair):

The changes requested by the CCC have all been implemented and a support letter from Mathematics has been added to the attached documents.

Comments from Version 4 from Ian Gawron (Curriculum Committee Secretary):

Due to total hours totaling over 120 and to inactivity, this proposal is rejected.

Comments from Version 5 from Todd Stewart (College Curriculum Committee Chair):

Hi. We haven't discussed this proposal carefully yet, but we've been made aware of a new general ISU policy that affects this proposal. Because of state law, ISU has had to set a threshold for when math prereqs must be included as part of a program. ISU chose MAT 144. So, you must include this in the list of requirements, and potentially increase the number of required hours. So, your proposal will have to be changed in light of this. I'm hitting the revise button now to allow you to try to address this issue right now.

You might contact one of the CAS CC members, Chris Hamaker (chamake@ilstu.edu) for advice on how to handle this, since he's had to handle the same issue in a CHE Teacher Ed proposal recently.

Thanks, Todd Stewart, Chair, CAS CC

