PROPOSAL: Subject Abbreviation: BIOL
Course Number: 55110
Long Title: Proteins: Structure and Function
Short Title: Proteins: Structure Function

CREDIT TYPE
1. Fixed Credit Cr. Hrs: 3
2. Variable Credit Range: Minimum Cr. Hrs: (Check One) To Or 
Maximum Cr. Hrs: 
3. Equivalent Credit: Yes No 
4. Thesis Credit: Yes No 

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Fail Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
4. Maximum Repeatable Credit:
5. Credit by Examination
6. Registration Approval Type
7. Variable Title
8. Honors
9. Full Time Privilege
10. Off Campus Experience

CAMPUS(ES) INVOLVED
- Calumet
- Cost Ed
- FT Wayne
- N Central
- Tech Statewide
- W Lafayette
- Indiana State

DF: BIOL 21600 or consent of instructor. A study of the principles governing protein structure and function. Topics covered include the mechanisms of enzyme action, multienzyme complexes, protein flexibility and dynamics, molecular movement and signal transduction by proteins inside cells. Bioinformatics and molecular biological techniques used for studying proteins will also be taught.

COURSE DESCRIPTION INCLUDE REQUISITES/RESTRICTIONS:

OFFICE OF THE REGISTRAR
(Grad Form 40G [Excel format] - Does not include the Graduate Council’s required supporting document. See pdf version of Form 40G)
Supporting Document to the Form 40G
for a New Graduate Course

To: Purdue University Graduate Council
From: Faculty Member: Jaiyanth Daniel
           Department: Biology
           Campus: Fort Wayne
Date: 6/10/15
Subject: Proposal for New Graduate Course

Contact for information if questions arise:
Name: Jaiyanth Daniel
Phone: 260-481-5703
Email: danielj@ipfw.edu
Address: SB334

Course Subject Abbreviation and Number: BIOL 55110
Course Title: Proteins: Structure and Function

Course Description:
A study of the principles governing protein structure and function. Topics covered include the mechanisms of enzyme action, multienzyme complexes, protein flexibility and dynamics, molecular movement and signal transduction by proteins inside cells. Bioinformatics and molecular biological techniques used for studying proteins will also be taught.

Semesters Offered:
Fall

A. Justification for the Course:

- This course will enable students to gain a deeper understanding of proteins which are biological molecules essential for all of the processes inside living cells. The understanding of protein structure and function requires an integration of knowledge gained by students in genetics, molecular biology, biochemistry and other subjects. Such an integration of knowledge is critical to biology majors at
the undergraduate and graduate levels who intend to pursue further studies in molecular biology or medicine. Graduate students seeking advanced knowledge in molecular biology and undergraduate biology majors, especially those in the Genetics, Cellular and Molecular Biology concentrations will benefit from the advanced topics covered in this course. BIOL 51700 is a similar course offered at West Lafayette for 2 credits. The proposed 3-credit course will be taught at a level appropriate for the master's degree—seeking graduate students in the IPFW biology department.

- The graduate students pursuing studies in molecular biology or related fields are the target audience. Seven biology graduate students and one biology undergraduate senior took the course when it was introduced as a Special Topics (BIOL 59500) 3-credit lecture in fall 2014. Anticipated enrollment is 5-7 graduate students and 5-7 undergraduate seniors. The reason for proposing this course at the 50000-level is to make it suitable for graduate students to receive credit towards their degree for this course. Graduate-level rigor of the course will be maintained through assignments requiring scientific writing and oral presentation of current research papers relevant to topics taught in class. Exams will include short-answer and essay-type questions requiring synthesis of information taught in lecture classes. Bioinformatics assignments will enable students to apply their classroom learning to real-world analysis of proteins.

- Anticipated enrollment
  - Undergraduate 5-7 undergraduate students
  - Graduate 5-7 graduate students

B. Learning Outcomes and Method of Evaluation or Assessment:

Describe the course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.). Expand lists and sub lists as needed.

- Objectives and Student Learning Outcomes
  - Students will gain a more complete understanding of how proteins are constructed and the diverse functions they play inside cells. Students completing the course will understand the mechanisms of enzyme action, multienzyme complexes, protein flexibility and dynamics, molecular movement and signal transduction by proteins inside cells. They will also learn the current bioinformatics and molecular biological techniques used for studying proteins. Apart from gaining current, in-depth knowledge, students completing this course will also develop their critical-thinking skills by reading and discussing scientific research articles. They will develop their scientific writing skills by preparing a written report that synthesizes and contextualizes the findings in an assigned research article. Students will also develop their oral presentation skills by delivering a short slide presentation to the class.
• Methods of Evaluation

<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>Methods of Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding of lecture material</td>
<td>Exams: Objective-type questions</td>
</tr>
<tr>
<td>Understanding of lecture material</td>
<td>Exams: Short-answer questions</td>
</tr>
<tr>
<td>Understanding of lecture material</td>
<td>Exams: Essay-type questions</td>
</tr>
<tr>
<td>Ability to acquire current knowledge by critical evaluation of scientific literature</td>
<td>Oral presentation on assigned scientific research article</td>
</tr>
<tr>
<td>Ability to acquire current knowledge by critical evaluation of scientific literature</td>
<td>Written report on assigned scientific research article</td>
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<tr>
<td>Use of bioinformatics tools to understand protein function</td>
<td>Homework project requiring written report</td>
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</table>

• Grading Criteria

Student performance in exams, written papers, oral presentations and bioinformatics assignments will be the criteria for grading. Final grade will be determined as follows: > 90% is A; 80-89% is B; 70-79% is C; 60-69% is D; < 60% is F.

<table>
<thead>
<tr>
<th>Grading Criteria (replace with check for all that apply)</th>
<th>Weight Toward Final Grade</th>
</tr>
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<tbody>
<tr>
<td>Exams</td>
<td>300 points</td>
</tr>
<tr>
<td>Papers and Projects</td>
<td>60 points</td>
</tr>
<tr>
<td>Attendance and Class Participation</td>
<td>40 points</td>
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<tr>
<td>Total</td>
<td>400 points</td>
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</table>

• Methods of Instruction

<table>
<thead>
<tr>
<th>Hours per Week</th>
<th>Method of Instruction (replace with check for all that apply)</th>
<th>Contribution to Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Lecture</td>
<td>Understanding of protein structure and function</td>
</tr>
</tbody>
</table>
C. Prerequisite(s):

- BIOL 21800 Genetics and Molecular Biology or consent of instructor

D. Course Instructor(s):

Provide the name, rank, and department/program affiliation of the instructor(s). Is the instructor currently a member of the Graduate Faculty? (If the answer is no, indicate when it is expected that a request will be submitted.) Add rows as needed.

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Dept.</th>
<th>Graduate Faculty or expected date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaiyanth Daniel</td>
<td>Assistant Professor</td>
<td>Biology</td>
<td>Yes</td>
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</tbody>
</table>

E. Course Outline:

The following topics will be given equal time and weightage in the course: Introduction to Protein Structure, Domain Organization of Proteins, Oligomeric Associations of Proteins, Protein Interactions Inside the Cell, Mechanisms of Enzyme Action, Protein Flexibility and Dynamics, Roles of Proteins in Molecular Transport, Transmission of Signals by Proteins, Function of Protein Complexes as Molecular Machines, Multienzyme Complexes, Techniques for Studying Proteins

F. Reading List (including course text):

- Primary Reading List
  - The required textbook is authored by an expert in proteins, Mike Williamson. Students will also be assigned current peer-reviewed research articles relating to protein structure and function by the instructor.

G. Library Resources

- The access to scientific journals provided by the library is sufficient for the instructor to retrieve current research articles for students to read.

H. Course Syllabus
BIOL 55110 - PROTEINS: STRUCTURE AND FUNCTION

FALL 2016
Credits: 3

Room: SB G20
TR 9:00-10:15 AM

Instructor: Dr. Jaiyanth Daniel
Office: SB 334
Phone: 481-5703
Email: danielj@ipfw.edu
Office Hours: Mon 10:30 – 11:30 AM; Thu 3:00 – 4:00 PM

Course Description: This course will explore the fascinating world of proteins which are the nanomachines that are indispensable to life because of their catalytic and structural functions. Students will learn the principles governing protein function and get an integrated view of proteins at the molecular, cellular and systemic level. Students will gain understanding of how enzymes work, how proteins make molecules move inside cells and transmit signals. Molecular biological techniques used for studying proteins will also be taught.

Required Textbook:

Additional Material: i>Clicker2 for classroom quiz participation.

Course Details:
Students should come prepared to class ready to fill in the notes and add important points throughout the lecture. Class participation is expected and will be assessed throughout the semester. This is an upper-level course meant for seniors and graduate students. Therefore, all students are expected to demonstrate/learn advanced skills in understanding and evaluating information related to molecular biology.

Blackboard:
Information pertaining to this class will be listed on the course Blackboard site. To access Blackboard go to https://ipfw.blackboard.com and log in with your IPFW username and password. From there you can access your list of available courses. You will want to check the site regularly for announcements, study guides, etc. Partial lecture notes will be posted on Blackboard. If you miss a class it is your responsibility to get the notes. Do not request full versions, they will not be distributed. To access course handouts you need to install the latest version of Adobe Reader. You can access the free download on the course Blackboard site (General Weblinks) or alternatively go to: http://get.adobe.com/reader/otherversions/.
Please see me immediately if you cannot access the course Blackboard site.

Classroom Policies:
Attendance: Your participation in class will be assessed by your iClicker responses during lectures. Group discussion will be encouraged during specified times in class. The total points for
iClicker answers for the whole semester are 40 points. If you maintain more than 95% attendance in lecture classes, you will be eligible for a 10 point bonus on your total points (after the final lecture). Your attendance will critically affect your performance in this course. If you miss a class, it is your responsibility to find out what was taught in the previous class.

**Cell Phones:** Cell phones should be turned off or on silent mode during class.

**Emails:** I encourage the use of email to contact me but please consider email etiquette. Use my email address at the top of this syllabus. Please write “BIOL 55110” in email subject line.

**Assesments:**
- **Exams:** There will be multiple-choice and short answer questions, all of which will cover the material from lecture and corresponding textbook sections. **There will be one essay-type question (for 10 points) per exam requiring a more detailed answer.** The focus should be on your lecture notes and the text should be used for preparing for class, clarifications, and extra information. Any material from lecture could appear on the exams, even if it is not included in your pre-printed notes- what this means is that the exam material is not restricted to the written lecture notes but will also encompass the verbal lecture that accompanies each set of notes.
- **Assignments:** There will be three assignments (60 points) involving real-world research-type problems that will enhance your understanding of the subject material.

**GRADING:**
- Exams (4 exams, 75 points each) : 300 points
- Assignments (3 assignments, 20 points each) : 60 points
- i>Clicker2 Participation in Lecture Class : 40 points
- BONUS POINTS for at least 95% attendance : (10 points)

**Total = 400 points**

**Grades**
- A : 90-100 %
- B+: 87-89 %
- B : 84-86 %
- B- : 80-83 %
- C+: 77-79 %
- C : 74-76 %
- C- : 70-73 %
- D+: 67-69 %
- D : 64-66 %
- D- : 60-63 %
- F : 0-59 %

- **All exams are the property of the instructor and must be returned after review.** You may request to look over your exam during my office hours or by appointment.

- **Make-Up Exams:** **Exams will not be given before the scheduled exam date.** You must make every effort to be in attendance for all exams. Make-up exams may be given at the discretion of the instructor for extreme circumstances and students must notify the instructor prior to the exam via email or phone. **There will be no make-up exam for the Final Exam.** Make-up exams will cover
the same material (not necessarily the same questions) as the original exam but will be designed differently and will include more short-answer and fill-in-the-blank questions than the original exam. Make-ups must be scheduled within 1 week of the original exam and students must be on time for the scheduled make-up exam, otherwise no credit will be given. If the university cancels class on the day of an exam the exam will take place on the next regularly scheduled class period.

Testing Policy:
- **No material other than pencils and erasers are permitted out on your desk during testing.**
  All book bags and purses must be stored under the desk.
- No cell phones or other electronic devices are permitted for any reason during testing!
- No student will be permitted to start the exam late, after the first student finished has left the room. Therefore it is imperative that you be on time for exams.
- No student will be allowed to leave the room and return during an exam.
- You may come to the front of the room to speak with me if you have any questions- do not ask the teaching assistants they will not be able to assist you for the lecture exams.
- **Bring a #2 pencil and your ID# to all exams.**

Testing and Scantron Instructions:
The following sections will need to be filled out on the scantron forms:
- First and last name
- 4-Digit ID number written AND bubbled in.

Academic Dishonesty:
Cheating, including but not limited to copying another student’s work, will not be tolerated. Any offense will result in failing the entire course and will be reported to the student’s major department chair and dean of their school per the Student Handbook.

Withdrawal Deadline:
The last day to withdraw from the course is notified in the IPFW Academic Calendar. If you are doing poorly you may drop the course and receive a grade of “W”.

Tools for Success-
Resources, Study Guides, and Review Sessions:
Notes: Come prepared to class and review your notes AFTER EVERY CLASS! Additional assistance will be given during office hours, by appointment, or through email.

Weblinks: Several links relevant to the lecture material will be provided on Blackboard- take advantage of these resources!

Students with Disabilities: If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb Union, Room 113, telephone number 481-6658) as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the website for SSD at http://new.ipfw.edu/disabilities/
Study Guides: Study guides will be posted on the course Blackboard site prior to the exams.

Technical Support: You may call the IPFW helpdesk at 481-6030 or go to the Blackboard help website at http://help.blackboard.com/student/index.htm if you need any assistance accessing the Blackboard course site or if you experience technical problems.

LECTURE SCHEDULE
Lecture #

1  Chapter 1: Protein Structure
2  Chapter 1: Protein Structure
3  Chapter 1: Protein Structure; Chapter 2: Protein Domains
4  Chapter 2: Protein Domains
5  Chapter 2: Protein Domains; Chapter 3: Oligomers
6  Chapter 3: Oligomers
7  Chapter 3: Oligomers;
8  **EXAM 1 (Chapters 1 – 3)**
9  Chapter 4: Protein interactions *in vivo*
10 Chapter 4: Protein interactions *in vivo* ASSIGNMENT 1 DUE
11 Chapter 4: Protein interactions *in vivo*;
12 Chapter 5: How enzymes work;
13 Chapter 5: How enzymes work
14 Chapter 6: Protein flexibility and dynamics
15 Chapter 6: Protein flexibility and dynamics;
16 **EXAM 2 (Chapters 4 – 6)**
17 Chapter 7: How proteins make things move
18 Chapter 7: How proteins make things move
19 Chapter 7: How proteins make things move;
20 Chapter 8: How proteins transmit signals ASSIGNMENT 2 DUE
21 Chapter 8: How proteins transmit signals
22 Chapter 8: How proteins transmit signals
23 **EXAM 3 (Chapters 7 – 8)**
24 Chapter 9: Protein complexes: Molecular machines
25 Chapter 9: Protein complexes: Molecular machines
26 Chapter 10: Multienzyme complexes;
27 Chapter 10: Multienzyme complexes ASSIGNMENT 3 DUE
28 Chapter 10: Multienzyme complexes;
29 Chapter 11: Techniques for studying proteins
30 Chapter 11: Techniques for studying proteins;
31 **FINAL EXAM (Chapters 9 – 11)**
Academic & Support Services

IPFW is committed to your academic and personal success. In addition to working with your academic advisor, take advantage of the many support systems the University offers to help you succeed.

**Academic Services**

**Centers for Academic Success and Achievement (CASA)** offer peer-based learning assistance for many classes. Services include tutoring (walk-in and by appointment), Supplemental Instruction, the Writing Center, and math testing. Visit tutortrac.ipfw.edu to schedule your appointment.
[|Kettler Hall 023|260-481-5419|www.ipfw.edu/casa|

**Mastodon Advising Center (MAC)** fosters personal development and informed decision making for many students by encouraging students to explore, evaluate, and identify their academic and career goals. MAC advises students who are exploring and deciding on a major, conditional students, and guest students. Check your myIPFW account for the name of your advisor.
[|Kettler Hall 109|260-481-5983|www.ipfw.edu/mac|

**Walter E. Helmke Library** offers students support for research through print, databases, online collections. Librarians are available for consultation appointments.
[|Helmke Library|260-481-6505|www.library.ipfw.edu|http://guides.library.ipfw.edu/asbionline|

**The Learning Commons** is a space for study, collaboration, and exploration. The Learning Commons desk checks out laptops, mobile devices, and projectors for students to use on group or individual projects.
[|Helmke Library 2nd Floor|260-481-6101|www.ipfw.edu/learning-commons|

**Support Services**

**Career Services** can help students choose a major, explore careers, and gain work experience through internships and co-ops; plus, there are career assessments to assist students selecting career paths and majors.
[|Kettler Hall 109|260-481-6689|www.ipfw.edu/career|

**Office of the Dean of Students** offers support services through the CARE (Communicate, Assess, Refer, Educate) model to improve the quality of student experience. Services include, but are not limited to, conflict resolution, intervention, education, and facilitation.
[|Walb Union 111|260-481-6601|www.ipfw.edu/dean|

**Office of Diversity and Multicultural Affairs (ODMA)** offers workshops designed for student success and administers the Academic Student Achievement Program (ASAP).
[|Walb Union 118|260-481-6608|www.ipfw.edu/odma|

**Services for Students with Disabilities (SSD)** determines and helps provide accommodations and services to students with disabilities. This support also includes temporary disabilities.
[|Walb Union 113|260-481-6657|www.ipfw.edu/sss|

**Student Assistance Program (SAP)** Offers free and confidential short-term group, individual, and couples counseling to all currently enrolled IPFW students.
[|Walb Union 111|1-800-721-8809|www.ipfw.edu/student-wellness|

**Center for Healthy Living** works with local physicians to meet your healthcare needs and to complement the services of a student's primary healthcare provider.
[|Walb Union 234|260-481-5748|www.ipfw.edu/clinic|

Resources for students at IPFW 1/2015