**PURDUE UNIVERSITY**

REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE

(50000-60000 LEVEL)

**DEPARTMENT:** Biology  
**EFFECTIVE SESSION:** Fall 2016

**INSTRUCTIONS:** Please check the items below which describe the purposes of this request.

- [ ] New course with supporting documents (complete proposal form)
- [ ] Add existing course offered at another campus
- [ ] Expiration of a course
- [ ] Change in course number
- [ ] Change in course title
- [ ] Change in course credit/type

**PROPOSED:**
- Subject Abbreviation: BIOL
- Course Number: 57810
- Long Title: Biology of Plant and Animal Disease Vectors
- Short Title: Biology of Disease Vectors

**EXISTING:**
- Subject Abbreviation: 
- Course Number: 
- Long Title: 
- Short Title: 

**TERMS OFFERED:**
- Check all that apply:
  - [x] Fall
  - [] Spring
  - [] Summer

**CAMPUS(ES) INVOLVED:**
- Calumet
- Fort Ed
- Tech State
- W. Lafayette
- Indianapolis

**CREDIT TYPE**

<table>
<thead>
<tr>
<th>1. Fixed Credit: Or Hrs.</th>
<th>1. Pass/Not Pass Only</th>
<th>6. Registration Approval Type</th>
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<tr>
<td>3</td>
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<thead>
<tr>
<th>2. Variable Credit Range:</th>
<th>2. Satisfactory/Unsatisfactory Only</th>
<th>7. Variable Title</th>
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<tbody>
<tr>
<td>Minimum Cr. Hrs. (Check One)</td>
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<td>To</td>
<td>Or</td>
<td>Maximum Repeatable Credit:</td>
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<tr>
<th>3. Equivalent Credit:</th>
<th>3. Credit by Examination</th>
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<tr>
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<tr>
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<table>
<thead>
<tr>
<th>Schedule Type</th>
<th>Minutes Per Unit</th>
<th>Measurings Per Week</th>
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<tr>
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<td>Recitation</td>
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<td>Practic/Obser</td>
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**COURSE DESCRIPTION (INCLUDE: REQUIREMENTS/RESTRICTIONS):**

In this course, students will learn about the biology of plant and animal disease vectors with respect to their interactions with the pathogens and hosts, epidemiology of diseases, disease control strategies. The pre-requisites are: BIOL 11800 and 21800; or instructor permission

**COURSE OUTCOMES:**

Upon completion of this course, students will be able to describe components of plant and animal vector-borne disease cycle, describe major groups of plant and animal disease vectors, understand epidemiology of vector-borne diseases, describe current and future control strategies, and evaluate scientific papers related to vector biology.

**Signature:**

- Calumet Department Head  
  Date: 11/5/15  
  Signature: [Signature]

- Calumet School Dean  
  Date: 11/16/15

- Calumet Director of Graduate Studies  
  Date:

- Fort Wayne Department Head  
  Date:  
  Signature: [Signature]

- Fort Wayne School Dean  
  Date:

- Fort Wayne Director of Graduate Studies  
  Date:

- Indianapolis Department Head  
  Date:  
  Signature: [Signature]

- Indianapolis School Dean  
  Date:

- IUPUI Associate Dean for Graduate Education  
  Date:

- North Central Department Head  
  Date:  
  Signature: [Signature]

- North Central School Dean  
  Date:

- North Central Director of Graduate Studies  
  Date:

- West Lafayette Department Head  
  Date:  
  Signature: [Signature]

- West Lafayette College Dean  
  Date:

- Date Approved by Graduate Council  
  Date:  
<table>
<thead>
<tr>
<th>Graduate Area Committee Convener</th>
<th>Date</th>
<th>Graduate Dean</th>
<th>Date</th>
<th>Graduate Council Secretary</th>
<th>Date</th>
</tr>
</thead>
<tbody>
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<td>West Lafayette Registrar</td>
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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: Punya Nachappa

Department: Biology
Campus: Fort Wayne

Date: 11/5/2015

Subject: Proposal for New Graduate Course

Contact for information if questions arise:
Name: Punya Nachappa
Phone: 260-481-6320
Email: nachappa@ipfw.edu
Address: 2101 E. Coliseum Blvd
Fort Wayne, IN 46805

Course Subject Abbreviation and Number: BIOL 57810

Course Title: Biology of Plant and Animal Disease Vectors

Course Description:
In this course, students will learn about the biology of plant and animal disease vectors with respect to their interactions with the pathogens and hosts, epidemiology of diseases, and disease control strategies.

Semesters Offered:
For the benefit of graduate student plan of study development, how frequently will this prototype be offered? Which semesters?
Fall semester each year

A. Justification for the Course:
Provide a complete and detailed explanation of the need for the course (e.g., in the preparation of students, in providing new knowledge/training in one or more topics, in meeting degree requirements, etc.), how the course contributes to existing majors and/or concentrations, and how the course relates to other graduate courses offered by the department, other departments, or interdisciplinary programs.
Justify the level of the proposed graduate course (500- or 600-level) including statements on, but not limited to: (1) the target audience, including the anticipated number of undergraduate and graduate students who will enroll in the course; and (2) the rigor of the course.

- There has been a significant increase in the number of vector-borne plant and animal disease epidemics in the recent years. For instance, thrips-transmitted Tospovirus and mosquito-transmitted Dengue virus. Knowledge about similarities and differences between plant and animal diseases will increase our understanding of ecology and epidemiology of vector-borne diseases and help develop sustainable control strategies. This course will help our students understand the ecological and economic impacts of vector-borne diseases as they decide on their future careers. Overall this course will benefit students in most concentrations including Ecology and Evolutionary Biology, Immunology and Microbiology, and Genetics and Molecular Biology.

- The course will be offered at the 500-level because students are expected to have knowledge about basic plant and animal biology and physiology (through BIOL 11900) and also genetics and molecular biology (through BIOL 21800). Both graduate students and seniors can register for the course. The anticipated enrollment is 20 students with greater proportion of graduates to undergraduates.

Use the following criteria:
Graduate Council policy requires that courses at the 50000 level in the Purdue system should be taught at the graduate level and meet four criteria: a) the use of primary literature in conjunction with advanced secondary sources (i.e., advanced textbooks); b) assessments that demonstrate synthesis of concepts and ideas by students; c) demonstrations that topics are current, and; d) components that emphasize research approaches/methods or discovery efforts in the course content area (reading the research, critiquing articles, proposing research, performing research). Such courses should be taught so that undergraduate students are expected to rise to the level of graduate work and be assessed in the same manner as the graduate students.

- Anticipated enrollment
  - Undergraduate 3-5
  - Graduate 10-15

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
  - Understand the evolution of host-insect vector-pathogen interactions.
- Students will be able to describe evolution of insects in general.
- Students will be able to describe insects and pathogen associations in plant and animal kingdoms.
- Students will be able to describe evolution of mouthparts and other insect traits that facilitates transmission of pathogens to plant and animal hosts.

  o Understand the components of plant and animal vector-borne disease cycle.
    - Students will be able to illustrate plant vector-borne disease cycle.
    - Students will be able to illustrate animal vector-borne disease cycle.
    - Students will be able to recognize similarities and differences in plant and animal vector-borne disease cycles.

  o Understand principles of epidemiology of plant and animal vector-borne diseases.
    - Students will be able to describe geographic location/spread of a particular disease.
    - Students will be able articulate reasons or and contributing factors for the observed epidemiological pattern of the disease.
    - Students will be able to describe current disease surveillance and epidemiological tools.

  o Differentiate major groups of plant and animal disease vectors and their associated pathogens.
    - Students will be able to list major groups of plant and animal disease vectors and the pathogens transmitted by each group.
    - Students will be able to distinguish biology of the different plant disease vectors.
    - Students will be able to distinguish biology of the different animal disease vectors.

  o Understand vector biology with respect to their interactions with the pathogens.
    - Students will be able to describe interaction of the pathogen within the insect body including, insect midgut (stomach), hind gut (intestine), hemolymph (blood), and salivary glands.
    - Students will be able to describe changes in major insect physiological process in response to pathogen infection including immune, digestive, excretory, and reproductive processes.

  o Analyze current and future plant and animal disease control strategies.
    - Students will be able to describe plant disease control strategies.
    - Students will be able to describe animal disease control strategies.
    - Students will be able to compare and contrast between plant and animal disease control strategies.
    - Students will evaluate advantages and disadvantages in current and future plant and animal disease control strategies.

  o Evaluate and communicate scientific knowledge to peers.
    - Students will be able to articulate scientific knowledge to their
- Students will evaluate positives and negatives of a scientific paper
- Students will be able to propose improvements to the current paper and future experiments

• Methods of Evaluation

Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.) Expand table rows as needed.

<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>Methods of Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand the evolution of host-insect vector-pathogen interactions</td>
<td>Exams and in-class participation</td>
</tr>
<tr>
<td>Understand the components of plant and animal vector-borne disease cycle.</td>
<td>Exams and in-class participation</td>
</tr>
<tr>
<td>Understand principles of epidemiology of plant and animal vector-borne diseases.</td>
<td>Exams and in-class participation</td>
</tr>
<tr>
<td>Differentiate major groups of plant and animal disease vectors and their associated pathogens.</td>
<td>Exams and in-class participation</td>
</tr>
<tr>
<td>Understand vector biology with respect to their interactions with the pathogens.</td>
<td>Exams and in-class participation</td>
</tr>
<tr>
<td>Analyze current and future plant and animal disease control strategies</td>
<td>Exams and in-class participation</td>
</tr>
<tr>
<td>Evaluate and communicate scientific knowledge to peers.</td>
<td>Presentation</td>
</tr>
</tbody>
</table>

• Grading Criteria

Grading criteria (select from checklist); include a statement describing the criteria that will be used to assess students and how the final grade will be determined. Add and delete rows as needed.

<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 and Quizzes</td>
<td>300 points</td>
</tr>
<tr>
<td>Papers and Projects</td>
<td>100 points</td>
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<tr>
<td>---------------------</td>
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</tr>
<tr>
<td>Attendance and Class Participation</td>
<td>50 points</td>
</tr>
</tbody>
</table>

The final grade will be based on the total points obtained from:
- Exam I- 100
- Exam II- 100
- Final exam-100
- Presentation-100
- Class participation - 50

The grading scale is as follows...
- A = 90-100%= 405-450
- B = 80-89%= 360-404
- C = 70-79%= 315-359
- D = 60-69%= 270-314
- F < 59%<270

- Methods of Instruction

Identify the method(s) of instruction and describe how the methods promote the likely success of the desired student learning outcomes. Add and delete rows as needed.

<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>02:45</td>
<td>Lecture</td>
<td>Lecture combined with in-class activities such as Think-pair-share, group discussions, class brainstorm etc will not help convey information to the students but also improve student learning</td>
</tr>
<tr>
<td>00:60</td>
<td>Presentation</td>
<td>Help students evaluate and communicate scientific knowledge to peers.</td>
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</tbody>
</table>

C. Prerequisite(s):

List prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence. Add bullets as needed.
- BIOL 11900 Principles of Structure and Function
- BIOL 21800 Genetics and Molecular Biology
- Instructor permission

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>Punya Nachappa</td>
<td>Assistant Professor</td>
<td>Biology</td>
<td>Yes</td>
</tr>
</tbody>
</table>

E. Course Outline:

Provide an outline of topics to be covered and indicate the relative amount of time or emphasis devoted to each topic. If laboratory or field experiences are used to supplement a lecture course, explain the value of the experience(s) to enhance the quality of the course and student learning. For special topics courses, include a sample outline of a course that would be offered under the proposed course.

(This information must be listed and may be copied from syllabus).

I. Insects and related arthropods and Evolution of arthropod disease vectors
II. Components of plant and animal vector-borne disease cycle
III. Epidemiology of plant and animal vector-borne diseases
IV. Plant pathogens, major vector groups, transmission, major examples-viral pathogens, bacterial pathogens and phytoplasmas, and fungal pathogens.
V. Animal pathogens, major vector groups, transmission, major examples-mosquito-borne diseases, other fly-borne diseases, tick-borne diseases, flea-borne diseases, louse-borne diseases, hemipteran bug-borne diseases and other arthropod-caused problems.
VI. Impact of pathogens on insect vector biology
VII. Current and future disease control strategies including vector transgenesis and paratransgenesis

F. Reading List (including course text):

A primary reading list or bibliography should be limited to material the students will be required to read in order to successfully complete the course. It should not be a compilation of general reference material.

A secondary reading list or bibliography should include material students may use
as background information.

- Primary Reading List
  - Virus-Insect-Plant Interactions, Edited by: Kerry F. Harris, Oney P. Smith and James E. Duffus
  - Microbe-vector Interactions in Vector-borne Diseases, Stephen H. Gillespie, Geoffrey L. Smith, Anne Osbourn
  - Biology of disease vectors, 2nd edition, William H. Marquardt
  - Infectious diseases and arthropods, 2nd edition, Jerome Goddard

G. Library Resources

Describe any library resources that are currently available or the resources needed to support this proposed course.

- Students will use SCOPUS and/or the Document Delivery Service to obtain current and seminal scientific articles pertaining to their presentation.

H. Course Syllabus

(While not a necessary component of this supporting document, an example of a course syllabus is available, for information, by clicking on the link below, which goes to the Graduate School’s Policies and Procedures Manual for Administering Graduate Student Program.

See Appendix K.

Indiana University-Purdue University Fort Wayne
BIOL 57810–Biology of Plant and Animal Disease Vectors
Course Syllabus

Instructor Information
Dr. Punya Nachappa
Office # SB388
Office hours: T (9-10 AM) and TH (9-10 AM) or by appointment
Phone: 260-481-6320
Email: nachappa@ipfw.edu

Course Information
Number of credit hours: 3
Days and times: Wednesday 6-8:45 PM
Room: Science Bldg

Course Description
There has been a significant increase in the number of vector-borne plant and animal disease epidemics in the recent years. For instance, thrips-transmitted Tospovirus and mosquito-transmitted Dengue virus. Knowledge about similarities and differences between plant and animal diseases will increase our understanding of ecology and epidemiology of vector-borne diseases and help develop sustainable control strategies. In this course, students will learn about the biology of plant and animal disease vectors with respect to their interactions with the pathogens and hosts, epidemiology of diseases, disease control strategies.

Course Learning Goals
Understand the evolution of host-insect vector-pathogen interactions.
Understand the components of plant and animal vector-borne disease cycle.
Understand principles of epidemiology of plant and animal vector-borne diseases.
Ability to describe major groups of plant and animal disease vectors and their associated pathogens.
Understand vector biology with respect to their interactions with the pathogens.
Ability to describe current and future plant and animal disease control strategies.
Ability to evaluate and communicate scientific knowledge to peers.

Prerequisites
BIOL 11900 and 21800; or instructor permission

Resources
- There is no text book for this course. Readings from books and primary literature will be provided each week, including the powerpoints for the class.
Recommended resources

- Microbe-vector Interactions in Vector-borne Diseases, Stephen H. Gillespie, Geoffrey L. Smith, Anne Osbourn
- Biology of disease vectors, 2nd edition, William H. Marquardt
- Infectious diseases and arthropods, 2nd edition, Jerome Goddard
- Virus-Insect-Plant Interactions, Edited by: Kerry F. Harris, Oney P. Smith and James E. Duffus

- Blackboard Learn: Most material will be available for download the day before the class meeting on Blackboard (https://ipfw.blackboard.com). Please check the site regularly for supplemental readings, important announcements, etc. Please get in touch with me immediately if you cannot access the Blackboard website for some reason.

Class Meeting Calendar

<table>
<thead>
<tr>
<th>Unit</th>
<th>Date</th>
<th>Topic</th>
<th>Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td>Insects and related arthropods and Evolution of insect vectors</td>
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<td></td>
<td></td>
<td>Components of vector-borne disease cycle</td>
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<td></td>
<td></td>
<td>Epidemiology of vector-borne diseases</td>
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<tr>
<td>II</td>
<td></td>
<td>Hemipteran vectors of plant diseases</td>
<td>Presentations (2)</td>
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<td></td>
<td></td>
<td>Thrips vectors of plant diseases</td>
<td>Presentations (2)</td>
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<td></td>
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<td>Fly vectors of plant diseases</td>
<td>Presentations (2)</td>
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<td>Beetle vectors of plant diseases</td>
<td>Presentations (2)</td>
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<td>Exam I</td>
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<td>III</td>
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<td>Mosquito vectors of animal diseases</td>
<td>Presentations (2)</td>
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<td>Other fly vectors of animal diseases</td>
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<td>Tick vectors of animal diseases</td>
<td>Presentations (2)</td>
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<td>Flea and Louse vectors of animal diseases</td>
<td>Presentations (2)</td>
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<td>Hemipteran bug and Other arthropod-caused problems</td>
<td>Presentations (2)</td>
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<td>Exam II</td>
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<td>IV</td>
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<td>Impact of pathogens on insect vector biology</td>
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<td>Control of insect vector-borne diseases</td>
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<td>Vector transgenesis and Paratransgenesis</td>
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<td>Comprehensive Final exam</td>
<td>6:15-8:15PM</td>
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</table>
**Note:** The course schedule is subject to change at the discretion of the instructor. You will be notified of changes through email, Blackboard website, and in class meetings.

**Grading**
The final grade will be based on the total points obtained from:
- Exam I- 100
- Exam II- 100
- Final exam-100
- Presentation- 100
- Class participation - 50

The grading scale is as follows...
- $A = 90-100\% = 405-450$
- $B = 80-89\% = 360-404$
- $C = 70-79\% = 315-359$
- $D = 60-69\% = 270-314$
- $F < 0-59\% < 270$

**Attendance and class etiquette**
- **Class meeting attendance:** I expect all students to attend class meetings and to complete all assignments. For official rules on attendance, please visit the student rules website (IPFW Undergraduate Bulletin, Part 8: Regulations, Policies, Rights, & Responsibilities). Moreover, you will have a chance to score points towards your grade by attending class and participating in in-class activities.
- **Class etiquette and conduct:**
  - I expect students to be seated and prepared at the start of the class meeting.
  - Please switch off your cell phones or turn on “silent” mode during class.
  - If you are late to class, please try to find your seat quietly without much disruption.
  - If you have to be late regularly, please discuss the reason with me and obtain approval.
  - If you missed a class, you will still be responsible for all class meeting materials discussed during the period(s) of absence.

- **Civility and ground rules for discussion:** Students will have full freedom to raise relevant questions pertaining to classroom discussions, and to express their opinions to those being discussed. Please visit the IPFW Undergraduate Bulletin, Part 8: Regulations, Policies, Rights, & Responsibilities for addition information. I expect you to adhere to Student Conduct Code in class, which states: “I am committed to creating a climate for learning characterized by respect for one another and the contributions each person makes to class”.

**Exams**
You will be required to take all exams the days they are scheduled. Makeup exams will be given only for university-authorized excuses such as a University-authorized activity, illness, death in the immediate family, and legal proceedings requiring the student’s presence etc. All excuses should be presented to me prior to the test date, if at all possible. At the latest, excuses must be discussed with me by the next day of class. Specific rules of conduct expected during exams will be discussed in detail before start of the exam.
Academic honesty
Academic dishonesty including any form of cheating and plagiarism will not be tolerated. The processes, procedures, rules and definitions associated with academic misconduct may be found at the IPFW Undergraduate Bulletin, Part 8: Regulations, Policies, Rights, & Responsibilities. Any misconduct will result in a "F" grade in the course and will be reported to the student's Department chair and Dean of their school as specified in the Student Handbook.

Students with special needs
All students with disabilities will be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Director of Services for Students with Disabilities (Walb Union, Room 113, telephone number 481-6659). 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/.

IPFW services for students
The URLs for the web sites are listed below:
- Bedford St. Martin's Research and Documentation: http://bcs.bedfordstmartins.com/resdoc5e/.
- Career Services: http://www.ipfw.edu/career/.
- Center for Women and Returning Adults: http://ipfw.edu/cwra/.
- Dean of Students Office: http://ipfw.edu/dos/.
- Information Technology Services Help Desk: http://ipfw.edu/helpdesk/.
- International Student Services: http://ipfw.edu/iss/.
- Library Service Desk: http://www.lib.ipfw.edu/
- Mastodon Advising Center (MAC): http://ipfw.edu/mac/.
- Multicultural Services: http://ipfw.edu/odma/.
- Purdue Online Writing Lab (OWL): http://owl.english.purdue.edu/owl/section/2/10/.
- Reserves Express (REX): http://www.lib.ipfw.edu/629.0.html.
- Services for Students with Disabilities: http://www.ipfw.edu/ssd/.
- Studio M: http://ipfw.edu/studiom/
- The Writing Center: http://ipfw.edu/offices/casa/writing/.
- University Calendar: http://ipfw.edu/academics/calendar/.

Student expectations of the instructor
- **Availability:** The best method and time to contact me is through Email, Blackboard, and office phone. In addition to my office phone, you can call the department at 260-481-6040. I will generally get back to you within a couple of days. If you need to meet with me personally please set up an appointment at least a day in advance.

- **Learning environment:** I will strive to create a student-centered, active learning environment. I will provide several opportunities for your input and will respond to your ideas. Your opinions, interests, learning styles, and needs will be the focus of the learning experience. So, please be active and participate in making this class informative and fun!

- **Course communication:** I may contact you between classes through individual and group emails. So please maintain an active IPFW email address and check it regularly for messages and check Blackboard course website.