Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate:  _X_ NEW  ____ MODIFY  ___DELETE

Local Unit:  Environmental Science & Policy  Graduate Council Approval Date:  

Course Abbreviation:  EVPP  Course Number:  615  

Full Course Title:  Molecular Environmental Biology II  

Abbreviated Course Title (24 characters max.):  MOLECULAR ENVIR BIOL II  

Credit hours: 4  Program of Record: Environmental Science & Policy  

Repeatable for Credit?  ___ D=Yes, not within same term  Up to hours  
  ___ T=Yes, within the same term  Up to hours  
  _N_ N=Cannot be repeated for credit  

Activity Code (please indicate):  _X_ Lecture (LEC)  _X_ Lab (LAB)  ___ 
  ___ Recitation (RCT)  
  ___ Studio (STU)  ___ Internship (INT)  ___ Independent Study (IND)  
  ___ Seminar (SEM)  

Catalog Credit Format  4 : 3 : 3  Course Level:  GF(500-600)  _X_  
  GA(700+)  ____  

Maximum Enrollment: 20  For NEW courses, first term to be offered:  
Prerequisites or corequisites:  A course in molecular environmental biology or permission of instructor.  

Catalog Description (35 words or less)  Please use catalog format and attach a copy of the syllabus for new courses:  An applied course covering the theory and methodology of molecular environmental biology including the analysis of selected case studies in conservation biology of macroorganisms, molecular systematics, and microbial ecology.  

For MODIFIED or DELETED courses as appropriate: 
Last term offered:  Previous Course Abbreviation:  Previous number:  

Description of modification:
APPROVAL SIGNATURES:

Submitted by: ________________________________ email: ________________

Department/Program: ________________________________ Date: ________________

College Committee: ________________________________ Date: ________________

Graduate Council Representative: ________________________________ Date: ______
GEORGE MASON UNIVERSITY  
Course Coordination Form

Approval from other units: NONE

Please list those units outside of your own who may be affected by this new, modified, or deleted course. Each of these units must approve this change prior to its being submitted to the Graduate Council for approval.

<table>
<thead>
<tr>
<th>Unit:</th>
<th>Head of Unit’s Signature:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graduate Council approval: ____________________________________________  Date: __________

Graduate Council representative: ________________________________________  Date: __________

Provost Office representative: __________________________________________  Date: __________
Instructor:  
Dr. Patrick Gillevet  
Associate Professor  
Environmental Science and Policy  
George Mason University, MSN 4E3,  
Manassas, VA 20100  
703-993-1057  
pgilleve@gmu.edu

Office hours:  TBA

Description:
An applied course covering the theory and methodology of molecular environmental biology including the analysis of selected case studies in conservation biology of macroorganisms, molecular systematics, and microbial ecology.

Methods of Instruction:
The material will be presented in lectures and discussion groups to review theory, lab sessions to learn techniques, and computer sessions for the analysis of data.

Objectives:
This course is intended to provide students with the skills and knowledge base to conduct publishable research in the molecular environmental biology realm. Topics covered will include Population Biology, Phylogeography, Phylogeny, Biocomplexity, Ecogenomics. Laboratory sessions will cover Cloning, PCR, DNA Sequencing, and Microarrays. Computational sessions will cover tools such as PAUP, Sequencher, GCG, Clustalx, Arlequin, Treecon.

Prerequisites:
This advanced course assumes a solid background in molecular biology, phylogeny, and computer skills. Students are required to have taken the introductory Molecular Environmental Biology I course or to obtain permission of the instructor.

Course Textbooks and Materials:
Reading will be assigned from the literature, textbooks, and from the Web.
- Molecular Cloning: A Laboratory Manual  Cold sring Harbor Laboratory Press
- Arlequin Manual
- Genetic Computer Group manual
- Scanalyze Manual

Credits: This course carries 3 credits for the Lecture and 1 credits for the Lab.

Grading: Grades will be based on:
- Class participation (10%). Class interaction will be measured by participation in class meetings and in discussions.
- Two presentations of case studies from the current literature (30%)
- Two reports on data analysis (30%)
- Two reports on laboratory experiments (30%)

Honor Code: Students may discuss assignments with others, but you must turn in your own work.

Computer resources:
- You will need to have access to email and the web to access assignments.
- All of these resources are available to GMU students at PWI and elsewhere.
- You may also need to read WWW documents in *.pdf (Adobe Acrobat) format or *.ps (Postscript) format.
- Readers are available for free for Windows, Macintosh and many unix platforms at the Adobe website and Ghostscript/Univ. of Wisconsin CS Dept.

COURSE SCHEDULE

Molecular Environmental Biology: General Tools

Week 1:
Lecture:
- Introduction and Course Plan
Lab:
- Literature Search
- Medline
• GMU Library
• Endnotes

Week 2:
Lab
• Data Search
• NCBI- ENTREZ
• BLAST
• Sequencher

Population Biology: Mitochondrial DNA

Week 3:
Lecture:
• Case Studies on Phylogeography and Phylogeny using Mitochondrial DNA
Lab:
• Background Data Search
• PAUP
• Analysis: Phylogeny/Phylogeography of Aves

Week 4
Lecture:
• Overview of mitochondrial purification
• Overview of Long PCR
• Experimental Preparation
Lab
• Long PCR
• Mitochondrial purification
• DNA extraction from Blood

Week 5
Lecture
• Overview of cloning
• Experimental plan
• Restriction Digestion
Lab
• Cloning Avian Mitochondrial RE Fragments

Week 6
Lecture
• Overview of sequencing
• Experimental plan
• PCR of Plasmids
Lab
  • Sequencing PCR products from plasmids
  • Sequencing Long PCR products (Genome Walking)

Week 7
Lecture
  • Overview of UNIX
  • Sequence Assembly
  • GCG
Lab
  • GCG Analysis
  • Analysis of Mitochondrial Data

**Population Biology: Microsatellites**
Week 8
Lecture
  • Case Studies using Microsatellites
Lab
  • Background Data search
  • Analysis

Week 9
Lecture
  • Overview of Microsatellite Analysis
  • Experimental plan
Lab
  • Microsatellite PCR

Week 10
Lecture
  • Population Biology
  • Overview of Arlequin
Lab
  • Haplotype Analysis with Arlequin

**Microbial Biocomplexity: MicroArrays**
Week 11
Lecture
  • Case Studies on Biocomplexity using Microarrays
Lab
  • Overview of Microarray Analysis
  • PCRs of Target DNA

Week 12
Lecture
• Microarray Target format
• Image Analysis
• Scanalyze
Lab
• PCR Cleanups
• Probe preparation

Week 13
Lecture
• Microarray Analysis
• J-Express
Lab
• Scan Image and Analysis

Week 14
Lecture
• Overview of Experimental Data
Lab
• Using J-Express on Experimental Data