

APPROVED

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MAR 20 2012

# The University Of Toledo

## New Graduate Course Proposal

COLLEGE OF GRADUATE STUDIES

\* denotes required fields

1. College\*:   
 Department\*:

2. Contact Person\*:  Phone:  (xxx - xxxx) Email:

3. Alpha/Numeric Code (Subject area - number)\*:  -

4. Proposed title\*:   
 Proposed effective term\*:  ( e.g. 201140 for 2011 Fall)

5. Is the course cross-listed with another academic unit?  Yes  No

Approval of other academic unit (signature and title):

Is the course offered at more than one level?  Yes  No

If yes, an undergraduate course proposal form must also be submitted. If the undergraduate course is new, complete the New Undergraduate Course Proposal; if the undergraduate course is existing, submit an Undergraduate Course Modification Proposal.

6. Credit hours\*: Fixed:  or Variable:

7. Delivery Mode:

	Primary*	Secondary	Tertiary
a. Activity Type *	<input type="text" value="DL/ONLINE"/>	--SelectType--	--SelectType--
b. Minimum Credit Hours *	<input type="text" value="3"/>		
Maximum Credit Hours *	<input type="text" value="3"/>		
c. Weekly Contact Hours *	<input type="text" value="9"/>		

8. Terms offered:  Fall  Spring  Summer

Years offered:  Every Year  Alternate Years

9. Are students permitted to register for more than one section during a term?  No  Yes

May the courses be repeated for credit?  No  Yes Maximum Hours

10. Grading System\*:  Normal Grading (A-F, PS/NC, PR, D)  Passing Grade/No Credit (A-C, NC)  Credit/No Credit  Grade Only (A-F, PR, D)  Audit Only  No Grade

11. Prerequisite (must be taken before): i.e. C or higher in (RICE 4500 or RICE 5500) and C or higher in MATH 4200

PIN (Permission From Instructor)  PDP (Permission From Department)

Co-requisites (must be taken together):

12. Catalog Description\* (75 words Maximum)

This course will introduce students to biostatistical concepts and methods for analyzing biomarker data. The course focuses on statistical methods for biomarkers to address various issues arising from studies assessing biomarkers in biomedical research and including associations with certain diseases or health conditions. The course presents both basic and advanced topics.







13. Attach a syllabus and an electronic copy of a complete outline of the major topics covered. Click [here](#) for template.

Syllabus:  Browse...

Additional Attachment 1: Browse...

Additional Attachment 2: Browse...

Course Approval:

Department Curriculum Authority:		Date <input type="text" value="3-12-12"/>
Department Chairperson:		Date <input type="text" value="3-12-12"/>
College Curriculum Authority or Chair:		Date <input type="text" value="3/13/12"/>
College Dean:		Date <input type="text" value="3/15/12"/>
Graduate Council:		Date <input type="text" value="4/17/2012"/>
Dean of Graduate Studies:		Date <input type="text"/>
Office of the Provost :		Date <input type="text"/>

[Submit New Course Proposal](#)

Administrative Use Only

<b>Effective Date:</b>	<input type="text" value=""/> (YYYY/MM/DD)
<b>CIP Code:</b>	<input type="text"/>
<b>Subsidy Taxonomy:</b>	<input type="text"/>
<b>Program Code:</b>	<input type="text"/>
<b>Instructional Level:</b>	<input type="text"/>

## **Biostatistical Methods for Biomarkers Tentative Syllabus**

### **Course Description**

Advances in recent high-throughput experimental technologies have generated enormous amounts of data and provided valuable resources to study biomarkers. Advances in statistical applications and computing capabilities are providing a powerful set of tools for analyzing biomarker data. This course will introduce students to biostatistical concepts and methods for analyzing biomarker data. The course focuses on statistical methods for biomarkers to address various issues arising from studies assessing biomarkers in biomedical research and including associations with certain diseases or health conditions. The course presents both basic and advanced topics, focusing on those that are relevant to the computational analysis of large data sets in biology. This course will cover many of the fundamental statistical and data mining approaches to support biomarker discovery and evaluation, emphasizing applications based on different types of "omic" data.

**Prerequisite:** Basic knowledge in biology and statistics (which will be reviewed).

### **Recommended Books**

Understanding Statistics in Exploratory Biomarker Analysis. Authors: Nusrat Rabbee, Richard Bourgon, Haiyan Huang. 2011 Chapman & Hall/CRC Biostatistics Series.

Bioinformatics and Biomarker Discovery: "Omic" Data Analysis for Personalized Medicine. E-Book, by Francisco Azuaje. 2010 John Wiley & Sons, Ltd.

Methods in Molecular Biology. Biostatistical Methods. Edited by Stephen W. Looney. 2002 Humana Press Inc. Totowa, New Jersey.

### **Course Learning Objectives:**

After successfully completing the course, student should be able to:

1. Identify the proper statistical design to investigate biomarkers
2. Design simple experimental & observational biomarker studies
3. Collect, process and summarize biomarker data
4. Select proper statistical tests to address specific hypotheses about biomarkers
5. Assess the reliability and validity of a given biomarker
6. Analyze biomarker data generated from "omic" technologies
7. Interpret advanced statistical tests in the biomarker literature

### **Suggested Lectures**

#### **Week 1**

Exploratory data analysis  
Basic Parametric Statistical tests

**Week 2**

Non-Parametric tests  
Multivariate Statistics

**Week 3**

Categorical data analysis  
Survival Analysis

**Week 4**

Reliability and validity  
Designing a biomarker study

**Week 5**

Biomarkers for Risk estimation  
Biomarkers for treatment Efficacy

**Week 6**

Biomarkers for prognosis  
Toxicology Biomarker

**Week 7****Genomics**

Microarrays  
PCR Arrays  
RT-PCR

**Week 8****Proteomics**

SELDI  
MALDI  
Other

**Week 9****Metabolomics****Week 10****Epigenomics.**

Methylation  
siRNA

**Week 11****Genome-wide Association**

Copy number variation  
SNP

**Week 12**

Applied biomarkers Analysis  
Reading the literature