New Course Request

Check Appropriate Boxes: Undergraduate credit [x]  Graduate credit [x]  Professional credit [ ]

1. School/Division  Science/Mathematics  2. Academic Subject Code  STAT

3. Course Number  N501  (must be cleared with University Enrollment Services)  4. Instructor  STAT

5. Course Title  Statistical Methods for Health Sciences

Recommended Abbreviation (Optional)  Stat Methods Health Sci

(Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year):  Spring 2010

7. Credit Hours: Fixed at  3  or Variable from  to  

8. Is this course to be graded S-F (only)? Yes [ ] No [x]

9. Is variable title approval being requested? Yes [ ] No [x]

10. Course description (not to exceed 50 words) for Bulletin publication: P: Math 15300. An introductory statistical methods course, with emphasis on applications in the health sciences. Topics include descriptive statistics, probability distributions, sampling distributions, confidence interval estimation, hypothesis testing, analysis of variance, linear regression, goodness-of-fit tests, and contingency tables. Credit cannot be given for more than one of STAT 30100, 35000, or 51100; or STAT N501.

11. Lecture Contact Hours: Fixed at  3  or Variable from  to  

12. Non-Lecture Contact Hours: Fixed at  or Variable from  to  

13. Estimated enrollment:  30  of which  50  percent are expected to be graduate students.

14. Frequency of scheduling: Fall/Spring Will this course be required for majors?  No

15. Justification for new course:  See attached document

16. Are the necessary reading materials currently available in the appropriate library?  Yes

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by:  

Department Chairman/Division Director  Date  7-22-2009

Dean of Graduate School (when required)  Date

Approved by:  

Dean  Date  11-01-09

Chancellor/Vice-President  Date

University Enrollment Services  Date

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.
STAT N501 Statistical Methods for Health Sciences

A. Instructor
   Debra Hall, M.S.
   Senior Lecturer, IUPUI Department of Mathematical Sciences
   dhall@math.iupui.edu
   Office: 317-278-4133
   Fax: 314-274-3460

   Prerequisites: MATH 15300. Consent of instructor may be used in satisfying course prerequisite.
   Credits: 3(Class: 3, Lab: 0)

B. Justification for the Course

Given the increasing focus on health related fields both nationally and on the IUPUI campus, STAT N501 is a graduate level course that will offer mature IUPUI students, with interests in the health sciences, opportunities to explore introductory statistical methods at a level of rigor similar to that afforded in STAT 503 Statistical Methods for Biology on the Purdue University (West Lafayette) campus. This course will expand coverage of several topics not included in an undergraduate methods course (nonparametric methods, Inference for Regression, expanded paired comparison, expanded categorical analysis)

STAT N501 will be open to all students (both degree-seeking and non-degree) with the appropriate prerequisite, regardless of current program of study. Credit earned will be subject to the student’s program of study. In cooperation with the IUPUI Honors College, undergraduate students who complete all requirements for this course would be granted honors credit.

Students seeking entry into health related professional programs are often required to earn credit in an introductory statistics course prior to acceptance into the programs. This course recognizes that many of these students are often more academically mature than many of the undergraduate students targeted in traditional undergraduate methods courses, which are currently the only option for meeting this admission requirement. These students recognize the role statistical concepts will play in their careers, they are driven to embrace those concepts at a depth lacking in traditional undergraduate courses. Additionally, the focus on the health sciences will provide these students with more intellectually challenging and professionally interesting examples, allow them to analyze more complex health related data sets to spark their curiosity/interests and provide them opportunities to examine health related journal articles which relate directly to their chosen fields.

This course also addresses the needs of individuals from the Greater Indianapolis area’s health related industries who contact IUPUI hoping to earn graduate credit in a course that will enrich and build upon the basic statistical concepts from their undergraduate studies. As today’s technology allows more people to “do” statistical calculations, many of these individuals recognize the limitations of their knowledge in using that information appropriately. Such students are not interested in pursuing graduate level statistics degrees, but rather seek graduate course work that will allow them to more adequately assimilate the statistical information that permeates their professional literature and to accurately interpret the results of the statistical methods used in their work. STAT N501 will help meet the needs of these potential students from our community.
C. Course Description for Bulletin

P: Math 15300. An introductory statistical methods course, with emphasis on applications in the health sciences. Topics include descriptive statistics, probability distributions, sampling distributions, confidence interval estimation, hypothesis testing, analysis of variance, linear regression, goodness-of-fit tests, and contingency tables. Credit cannot be given for more than one of STAT 30100, 35000, or 51100; or STAT N501.

D. Educational Objectives/Learning Outcomes

Course Objectives: The purpose of this course is to develop a fundamental working knowledge of the ideas and tools of statistical practice as applied to the Health Sciences. Over the course of the semester, students will explore and develop an understanding of topics that address three major aspects of statistical studies:

- **Data analysis** which includes methods for exploring, organizing, and describing data.
- **Data production** methods that produce useful data while considering the ethical limitations of studies involving living beings.
- **Statistical inference** methods that allow us to draw broader conclusions from the data, while taking into account that variation makes those conclusions uncertain.

Learning Outcomes: At the completion of this course, a successful student will be able to:

- Understand the statistical methodologies used in health related journals and evaluate the validity and limitations of the presented statistical arguments.
- Recognize and articulate statistical misuse and/or misinterpretation.
- Solve basic probability problems that provide the theoretical foundation of statistical inference.
- Choose and apply appropriate statistical methods to real world data using Minitab and manual calculation.
- Identify and verify the assumptions necessary for application of statistical procedures.
- Draw conclusions and make decisions based on statistical analyses, articulating the limitations and uncertainties of those conclusions.
- Express, in writing, the results of statistical analyses (including the procedures used, limitations and recommendations for further analysis).
- Understand and identify ethical considerations in data collection and study design.
- Recognize the types of questions that can be addressed, as well as the limitations, of the studied statistical methods.

E. Course content

1. **Description of Populations and Samples:** Graphical and Quantitative tools
2. **Principles of Design; Ethics:** Observational and Experimental Studies, Ethical considerations
3. **Random Sampling, Probability**
4. **Probability Distributions:** Binomial, Normal, Student t
5. **Sampling Distributions:** Dichotomous and Quantitative Observations
6. **Confidence Intervals:** $\mu, p, \mu_1 - \mu_2$
7. **Hypothesis Tests:** Two independent samples, t-test, Wilcoxon-Mann-Whitney
8. **Paired Comparisons:** Confidence intervals and hypothesis tests
9. **Analysis of Categorical Data:** chi square tests
10. **Comparing the Means of Many Independent Samples:** ANOVAs
11. **Linear Regression and Correlation:** fitting least squares models, interpreting models, inference ideas on extending to multiple regression, logistic regression

**F. Resources**

*Statistics for the Life Sciences*, 3rd edition (4th when available), Samuels & Witmer

Various health related journals

**G. Grading and Evaluation**

Grades will be determined using a percentage of actual points earned on the following scale: $A+=[95, 100], A=[90, 94], A-= [85, 89], B+= [80, 84]$, etc. grading scheme. Final grades will be based on the total points accumulated as follows:

<table>
<thead>
<tr>
<th>Data Analysis Projects (2@50 each)</th>
<th>100 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes/HW (Best 9 of 10)</td>
<td>135 pts</td>
</tr>
<tr>
<td>2 Exams (100 pts each)</td>
<td>200 pts</td>
</tr>
<tr>
<td>Final Project/ Exam</td>
<td>200 pts</td>
</tr>
<tr>
<td><strong>Total Points Possible</strong></td>
<td><strong>660 pts</strong></td>
</tr>
</tbody>
</table>

**Data Analysis Projects:**

There will be 2 projects worth 50 points each and a final project which will be part of the 200 point final exam. Projects will require the student to use Minitab statistical software and to apply class concepts to explore and analyze a real world data. Students will prepare a detailed typed written report (per written instructions) that clearly communicates important features of the data, conclusions that can be drawn from the data as well as any special considerations and limitations that have been identified. The data analysis projects will be especially important in discerning the students' ability to select appropriate methods, verify the relevant assumptions for their use and interpret the results of the analysis through written reports. **No late projects will be accepted except in extreme circumstances;** then only with prior arrangement with the instructor. Each student's written work must reflect their individual effort ONLY.

**Quizzes and Homework:**

There will be 10 quizzes (over recently assigned material) or assignments from the text or other sources. The purpose of these activities is to identify any major misunderstandings in course concepts before exams and keep students on task. There are **no make ups on quizzes or homework** for any reason. To allow for an illness or emergency, only the highest 9 out of 10 quizzes/homework will be counted.
Exams:
There will be 2 100 point exams during the semester covering the most recently covered material and a 200 point Final Project and Exam which will require the student to apply many of the methods from throughout the course. The in class exams will be closed-book and closed-notes but you will be allowed the use of a provided formula sheet and calculator. Makeup exams are only allowed in verifiable, emergency situations; then only with prior arrangement and approval of the instructor.

H. Academic Integrity

The IUPUI Department of Mathematical Sciences expects all students to adhere to the regulations put forth in the “IUPUI Code of Student Rights, Responsibilities, and Conduct” concerning academic or personal misconduct. The Code of Conduct can be found at: www.iupui.edu/code/ Cheating, including any duplication in written responses, on assignments and tests or other academic works is a violation of university policy. Any behavior that is construed as cheating or academic dishonesty will not be tolerated in this course. This includes, but it is not limited to, plagiarism, cheating during exams, acquisition of tests or other academic materials, as well as aiding and abetting others in committing the violation. Violations of these rules will result in a grade of "F" (or 0%) for the assignment in question, and may result in an "F" for the course or even expulsion from the university (see Part V of the code).

I. Americans with Disabilities Act
If you need any special accommodations due to a disability, please contact Adaptive Educational Services (AES) located in Joseph T. Taylor Hall (UC), Room 137. (317) 274-3241. For details, see http://www.iupui.edu/~diversity/aes/