New Course Request **Indiana University** Indianapolis Campus

Check Appropriate Boxes: Undergraduate credit ☐ Graduate credit ☒ Professional credit ☐

1. School/Division Science/Mathematical Sciences 2. Academic Subject Code STAT
3. Course Number 52100 (must be cleared with University Enrollment Services) 4. Instructor S. Ghosh
5. Course Title Introduction to Statistical Computing

   Recommended Abbreviation (Optional) _____
   (Limited to 32 Characters including spaces)
6. First time this course is to be offered (Semester/Year): Fall 2009
7. Credit Hours: Fixed at 3.0 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: STAT 51200 or MATH 35100 or MATH 51100. The course demonstrates how computing can be used to understand the performance of core statistical methods and introduces modern statistical methods that require computing in their application. Covers relevant programming fundamentals in at least two programming environments (e.g. SAS and R/Splus).
11. Lecture Contact Hours: Fixed at 3 or Variable from _____ to _____
12. Non-Lecture Contact Hours: Fixed at N/A or Variable from N/A to _____
13. Estimated enrollment: 20 of which 100% percent are expected to be graduate students.
14. Frequency of scheduling: Fall Will this course be required for majors? No
15. Justification for new course: Needed to enhance the training of students in the Applied Statistics Program.
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: Date 4/1/09
Department Chairman/Division Director

Approved by: Date 4/17/2009
Dean

Date _____
Dean of Graduate School (when required)

Date _____
Chancellor/Vice-President

Date _____
University Enrollment Services

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.

UPS 724

University Enrollment Services Final—White; Chancellor/Vice-President—Blue; School/Division—Yellow; Department/Division—Pink; University Enrollment Services Advance—White

Office of the Registrar
FORM 40G REV. 7/08

PURDUE UNIVERSITY

REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF A GRADUATE COURSE
(50000-60000 LEVEL)

Print Form

DEPARTMENT Science/Mathematical Sciences

EFFECTIVE SESSION Fall 2009

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

- [X] 1. New course with supporting documents (complete proposal form)
- [ ] 2. Add existing course offered at another campus
- [ ] 3. Expiration of a course
- [ ] 4. Change in course number
- [ ] 5. Change in course title
- [ ] 6. Change in course credit/type
- [ ] 7. Change in course attributes
- [ ] 8. Change in instructional hours
- [ ] 9. Change in course description
- [ ] 10. Change in course requisites
- [ ] 11. Change in semesters offered
- [ ] 12. Transfer from one department to another

PROPOSED:

Subject Abbreviation: STAT
Course Number: 52100
Long Title: Introduction to Statistical Computing
Short Title: Intro to Statistical Computing
Abbreviated title will be entered by the Office of the Registrar if omitted. (30 CHARACTERS ONLY)

EXISTING:

Subject Abbreviation:
Course Number:

TERMS OFFERED
Check All That Apply:
[ ] Summer [X] Fall [X] Spring

CAMPUS(ES) INVOLVED
[ ] Calumet [ ] N. Central
[ ] Cont Ed [ ] Tech Statewide
[ ] Ft. Wayne [ ] W. Lafayette
[X] Indianapolis

CREDIT TYPE
1. Fixed Credit: Cr. Hrs. 3.0
2. Variable Credit Range:
Minimum Cr. Hrs
(Check One) To [ ] Or [ ]
Maximum Cr. Hrs.
3. Equivalent Credit: Yes [ ] No [X]
4. Thesis Credit: Yes [ ] No [X]

COURSE ATTRIBUTES: Check All That Apply
1. Pass/Not Pass Only [ ]
2. Satisfactory/Unsatisfactory Only [ ]
3. Repeatable [ ]
Maximum Repeatable Credit: [ ]
4. Credit by Examination [ ]
5. Special Fees [ ]
6. Registration Approval Type
Department [ ] Instructor [ ]
7. Variable Title [ ]
8. Honors [ ]
9. Full Time Privilege [ ]
10. Off Campus Experience [ ]

Schedule Type	Minutes Per Mtg	Meetings Per Week	Weeks Offered	% of Credit Allocated
Lecture	75	2	16	100
Recitation				
Presentation				
Laboratory				
Lab Prep				
Studio				
Distance				
Clinic				
Experiential				
Research				
Ind. Study				
Pract/Observ				

Cross-Listed Courses

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

P: STAT 51200 or MATH 35100 or MATH 51100. The course demonstrates how computing can be used to understand the performance of core statistical methods and introduces modern statistical methods that require computing in their application. Covers relevant programming fundamentals in at least two programming environments (e.g. SAS and R/Splus).

Calumet Department Head	Date	Calumet School Dean	Date	Calumet Undergrad Curriculum Committee	Date
Fort Wayne Department Head	Date	Fort Wayne School Dean	Date	Fort Wayne Chancellor	Date
Indianapolis Department Head	4/1/09 Date	Indianapolis School Dean	4/17/2009 Date	Undergrad Curriculum Committee	Date
North Central Department Head	Date	North Central Chancellor	Date	Date Approved by Graduate Council	
West Lafayette Department Head	Date	West Lafayette College/School Dean	Date	Graduate Council Secretary	Date
Graduate Area Committee Convener	Date	Graduate Dean	Date	West Lafayette Registrar	Date

OFFICE OF THE REGISTRAR

Supporting Document for a New Graduate Course

To: Purdue University Graduate Council

From:
Faculty Member: Samiran Ghosh
Department: Math
Campus: IUPUI

Date: 04/06/2009

Subject: Proposal for New Graduate Course-Documentation Required by the Graduate Council to Accompany Registrar's Form 40G

For Reviewer's comments only (Select One)

Reviewer:

Comments:

Contact for information if questions arise:
Name: Andrea Brian
Phone Number: 317-278-4127
E-mail: abrian@math.iupui.edu
Campus Address: LD 270

Course Subject Abbreviation and Number: STAT 52100

Course Title: Introduction to Statistical Computing

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 fields of study and/or areas of specialization, 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 (50000- or 60000-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.

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.).

- Describe the methods of evaluation or assessment of student learning outcomes. (Include evidence for both direct and indirect methods.)

- Grading criteria (select from dropdown box); include a statement describing the criteria that will be used to assess students and how the final grade will be determined.

Criteria Papers and Projects

- Identify the method(s) of instruction (select from dropdown box) and describe how the methods promote the likely success of the desired student learning outcomes.

Method of Instruction Lecture

C. Prerequisite(s):

- List prerequisite courses by subject abbreviation, number, and title.
- List other prerequisites and/or experiences/background required. If no prerequisites are indicated, provide an explanation for their absence.

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? ___ Yes ___ No
  (If the answer is no, indicate when it is expected that a request will be submitted.)

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.

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.

G. Library Resources

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

H. Example of a 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 Programs*. See Appendix K.)

http://www.gradschool.purdue.edu/downloads/Graduate_School_Policies_and_Procedures_Manual.pdf

Supporting Document for a New Graduate Course
STAT 52100 Introduction to Statistical Computing

A. Justification for the Course

This is an introductory course to learn computing as required by other statistics course in and outside IUPUI. The main goals of this course are to demonstrate how computing can be used to understand the performance of core statistical methods, and to introduce modern statistical methods that require computing for their application. Relevant programming fundamentals are also covered. Students will learn computing in two entirely different programming environments, namely SAS and R/Splus. The semester will be roughly divided into two half's. In the first half students will learn SAS and the second half will be dedicated mostly to R/Splus. LaTex will be covered in at least one or two lectures (probably at the very end of the semester). Note that LaTex is not a computing environment; rather it is used to write mathematical reports/papers, and therefore is a useful tool for future. No prior programming experience is required; however knowledge about the core statistical methodology (probability/regression/ANOVA) is necessary.

This course is designed for both M.S. students in the Applied Statistics program (as an elective course) and for first-year Ph.D. students in the Biostatistics Ph.D. program. Although it is also an elective for the Ph.D. students, it is a required prerequisite for the course BIOS S621 (Advanced Statistical Computing). BIOS S621 can be chosen by Ph.D. students to serve as an advanced elective in their program.

B. Learning Outcomes and Method of Evaluation or Assessment

Learning Outcomes

As described in Part A, the focus of the course is on learning computing in two entirely different programming environments, namely SAS and R/Splus.

Method of Evaluation/Assessment

- There will be project assignments due either every week or every other week.
- There will be no exam in this course; however, there will be a final term project.
- The class grades will be determined based on your performance in all course requirements. (100%-80% A, 80%-70% B, 70%-60% C, 60%-50% D)
    - 80% on class projects
    - 20% on final term project. The final term project will be significantly more involved than a regular class project and you will have to make a presentation of your findings.
        - 10% for oral presentation
        - 10% for quality of the project

C. Prerequisites

Knowledge of knowledge the core statistical methodology (probability/regression/ANOVA) is necessary, so completion of a course like STAT 51200 (Applied Regression Analysis)

would be helpful. An undergraduate level course in linear algebra (such as MATH 35100 or MATH 51100), or the consent of the instructor, may also serve as the prerequisite.

D. Course Instructor

Samiran Ghosh
Email: samiran@ math.iupui.edu
Phone: 317-278-0473
Office: LD 224U

E. Course Outline

Tentative Course Schedule

DATE	TOPICS	LINKS
Jan 7th	An Introduction to SAS System (Version 9.xx)	Handout1
Jan 9th	Manipulating data in SAS	Handout2
Jan 14th		Handout3 , SAS3
Jan 16th	Proc Format	Handout4
Jan 23th		
Jan 28th		
Jan 30th	Introduction to SAS Graphics	Handout5 white_paper
Feb 4th	Introduction to PROC IML	Handout6
Feb 6th		
Feb 11th		Handout7
Feb 13th		Handout8
Feb 18th	Introduction to SAS Macro	Notes will be emailed
Feb 20th		
Feb 25th	Introduction to R	RHandout1
Feb 27th		RHandout2
March 3th		
March 5th	Some R Facts	RHandout3
Week of March 10th	Spring Break	Project Description
March 17th	No Class	
March 19th	Import export in R	RHandout4
March 24th	A short notes on LaTex	latex1 latex2
March 26th		
March 31th	Functions and Loops in R	RHandout5
April 2th		
April 7th	R Graphics	RHandout6 some codes

April 9th		
April 14th	Grid Based Graphics	RHandout7
April 16th	Random no generation	Random (Thanks to Christian Robert)
April 21th	Monte Carlo methods	Monte Carlo (Thanks to Michael Mascagni)
April 23rd	Essence of EM algorithm	EM Algo (I will cover first 50 pages only)
April 28th	Project Presentation	

F. Reading List

Textbooks:

- *The Little SAS Book: A Primer (3rd edition, 2003)* by Delwiche and Slaughter (ISBN: 1-59047-333-7)
- *Introductory Statistics with R (2002)* by Dalgaard (ISBN: 0-387-95475-9)

Programs:

- *SAS* (available in LD 225 or other campus computer labs)
- *R* (available in LD 225 or at www.R-project.org (free to download))

Additional resources (available from course website):

1. Monte Carlo Statistical Methods (2nd edition) by Christian P. Robert, George Casella
2. A whole book R for the beginners
3. Data Mining with R
4. Writing R package
5. Brief History of Monte Carlo

G. Library Resources

N/A

H. Example of a Course Syllabus

STAT 52100 (3 cr.)
Introduction to Statistical Computing

Syllabus

A. Instructor:

Dr. Samiran Ghosh
Email: samiran@ math.iupui.edu
Office Hours: 4:30-5:30PM on Monday and Wednesday, or by appointment (LD 224U)

B. Brief Course Description and Educational Objectives:

This is an introductory course to learn computing as required by other statistics course in and outside IUPUI. The main goals of this course are to demonstrate how computing can be used to understand the performance of core statistical methods, and to introduce modern statistical

methods that require computing for their application. Relevant programming fundamentals are also covered. We will learn computing in two entirely different programming environments, namely SAS and R/Splus . The semester will be roughly divided into two half's. In the first half we will learn SAS and the second half we will dedicate mostly to R/Splus. I also intend to cover LaTex in at least one or two lectures (probably at the very end of the semester). Note that LaTex is not a computing environment; rather it is used to write mathematical reports/papers. Nevertheless, this is a useful tool for future. No prior programming experience is required; however knowledge about the core statistical methodology (probability/regression/ANOVA) is necessary.

This course is designed for both M.S. students in the Applied Statistics program and for first-year PhD students in the Biostatistics Ph.D. program. It is a required prerequisite for the course BIOS S621 (Advanced Statistical Computing).

C. Prerequisites:

Knowledge of knowledge the core statistical methodology (probability/regression/ANOVA) is necessary, so completion of a course like STAT 51200 (Applied Regression Analysis) would be helpful. An undergraduate level course in linear algebra (such as MATH 35100 or MATH 51100), or the consent of the instructor, may also serve as the prerequisite.

D. Course Activities & Evaluation:

- There will be project assignments due either every week or every other week.
- There will be no exam in this course; however, there will be a final term project.
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I. Cheating and Plagiarism:

Academic misconduct will *not* be tolerated and all cases will be reported. Examine the IU Code of Student Rights, Responsibilities, and Conduct at http://www.iupui.edu/code and in particular examine the rules regarding academic misconduct at http://www.iupui.edu/code/#P2_G. 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 http://life.iupui.edu/rights/undergrad/sanctions.html).

J. Americans with Disabilities Act

If you need any special accommodations due to a disability, please contact Adaptive Educational Services at (317)-274-3241. Joseph T. Taylor Hall (UC), Room 137.

STAT 52100 (3 cr.)
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