

Term Information

Effective Term Spring 2019
Previous Value Summer 2012

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

To reduce the number of credit hours from 3 to 2.

What is the rationale for the proposed change(s)?

This course is one of the 7000-8000 level electives that we converted from the previous 3-hour, quarter version to a 3-hour, semester version by including additional material to utilize the additional number of contact hours. Such conversions have had the adverse consequence of reducing flexibility in our ability to offer topics courses. To increase our graduate students' exposure to diverse topics and also to increase the flexibility in scheduling, we propose to reduce the number of credit hours for this course from 3 to 2. This change will allow us to offer this course as a half-semester course and potentially allow for other 2-hour topics courses to be offered in the same semester. The coverage of topics will be adjusted accordingly for two credit hours.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

None. The total number of hours of electives required for our graduate programs will remain the same.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area Statistics
Fiscal Unit/Academic Org Statistics - D0694
College/Academic Group Arts and Sciences
Level/Career Graduate
Course Number/Catalog 7630
Course Title Nonparametric Function Estimation
Transcript Abbreviation Nonpar Func Estim
Course Description Function estimation with emphasis on smoothing splines, flexible model building with multivariate data, reproducing kernel Hilbert space methods, additional topics in smoothing.
Semester Credit Hours/Units Fixed: 2
Previous Value Fixed: 3

Offering Information

Length Of Course 14 Week, 12 Week, 8 Week, 7 Week, 6 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? No
Grading Basis Letter Grade
Repeatable No
Course Components Lecture
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No

Off Campus Never
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites Prereq: 6802 and 6950, or permission of instructor.
Previous Value Prereq: 6802 (622) and 6950 (645), or permission of instructor.
Exclusions Not open to students with credit for 763.
Electronically Enforced No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 27.0501
Subsidy Level Doctoral Course
Intended Rank Masters, Doctoral

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes • Students understand the relation between parametric and nonparametric models for data and the role of penalization or regularization in modeling.

Previous Value

Content Topic List • Smoothing splines
• Smoothing parameter selection
• Bias-variance trade-off
• Spline ANOVA models
• Reproducing kernel Hilbert space
• Kernel methods

Sought Concurrence No

Attachments

• stat7630syllabus19Sp.pdf: syllabus
(Syllabus. Owner: Lee, Yoonkyung)

Comments

COURSE CHANGE REQUEST
7630 - Status: PENDING

Last Updated: Haddad,Deborah Moore
08/20/2018

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Lee,Yoonkyung	08/20/2018 04:25 PM	Submitted for Approval
Approved	Lee,Yoonkyung	08/20/2018 04:26 PM	Unit Approval
Approved	Haddad,Deborah Moore	08/20/2018 04:39 PM	College Approval
Pending Approval	Nolen,Dawn Vankeerbergen,Bernadette Chantal Oldroyd,Shelby Quinn Hanlin,Deborah Kay Jenkins,Mary Ellen Bigler	08/20/2018 04:39 PM	ASCCAO Approval

STAT 7630 Nonparametric Function Estimation Spring 2019

Lecture: time and location TBD (2 credit hours)

Instructor: Yoonkyung Lee
Office: 305B Cockins Hall
Office Hours: TBD
Email: yklee@stat.osu.edu

Grader: TBD
Office:
Office Hours: by appointment only
Email:

Text: *Smoothing Spline ANOVA Models* by Chong Gu (2013), 2nd edition, Springer.
References: *Spline Models for Observational Data* by Grace Wahba.
Nonparametric Regression and Generalized Linear Models by Peter Green and Bernard Silverman.
Learning with kernels by Bernhard Schölkopf and Alexander Smola.

Website: The course has a web page on Carmen (<https://carmen.osu.edu/>). You will find homework assignments, solutions, and other course announcements on the web page. Please check it on a regular basis.

Prerequisites: Mathematical maturity in analysis and linear algebra, and a good knowledge of basic statistical inference (6802) and regression (6450/6950) are expected. Some knowledge of functional analysis (familiarity with Hilbert spaces), multivariate analysis (6560), and generalized linear models (7430) would be helpful, but not required. The course development is intended to be self-contained.

Course Description:

Statistics 7630 aims to introduce a nonparametric function estimation method with roughness penalties. Starting from smoothing splines for univariate data, a unified framework for penalized likelihood approach will be developed for flexible model building with splines covering multivariate data with both Gaussian and non-Gaussian responses. Mathematical formulation of smoothing splines, reproducing kernel Hilbert space methods, selection of a smoothing parameter, computation, and their applications will be treated in detail. In addition, connection between spline models and kernel methods in machine learning (especially support vector machines) will be discussed.

Grading: There will be no in-class written exam. Course grades will be assigned on the basis of performance on homework assignments (40%) and the take-home final (60%). Tentatively, the take-home final will be given on April 22 and due on April 29.

Homework Assignments: Homeworks will be assigned approximately weekly. Homework will involve analytical exercises, computational work using R, and data analysis. Each homework (a hard copy of your work) will be due at the beginning of class on the due date. No late homework will be accepted. Homework assignments and solutions will be posted on the course web page.

Tentative Course Schedule:

Week	Topics
1	Introduction to smoothing splines (CG 1.1, GW Foreword, GS Ch 1) Splines for interpolation and smoothing (GS 2.1-2.3), Natural splines, B-splines
2	Functional analytic approach to smoothing splines (CG 2.3, GW 1.2-1.3) Characterizing the solution to the smoothing problem, Representer theorem
3	Influence of the tuning parameter on smoother matrix (CG 3.1, GW 1.3) Smoothing parameter selection, cross-validation (CG 3.2, GW 4.2-4.3, GS 3.1-3.4)
4	Smoothing splines as Bayes estimates (CG 2.5, GW 1.5, GS 3.8) Confidence intervals (CG 3.3, GW Ch 5)
5	Introduction to Reproducing Kernel Hilbert Spaces (CG 2.1, GW 1.1, SS 2.1-2.2) Properties of reproducing kernels (CG 2.1, 2.4)
6	Smoothing Spline ANOVA models (CG 3.1, GW Ch 10) Generalized spline models with non-Gaussian responses (CG 5.1-5.3, GS 5.1-5.3)
7	Support vector machines (SS 7.1-7.3) Nonlinear support vector machines, Constrained optimization (SS 7.4-7.5)

Academic Misconduct: Please help us to maintain an academic environment of mutual respect, fair treatment, and personal growth. Although students are encouraged to work together on homework assignments, all students must submit their own written work **IN THEIR OWN WORDS**. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Special Accommodations: Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614-292-3307, slds@osu.edu; slds.osu.edu.