

Term Information

Effective Term Autumn 2020

Course Change Information

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

Allowing the course to be fully online.

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

COVID-19

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.

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, Undergraduate
Course Number/Catalog	5730
Course Title	Introduction to R for Data Science
Transcript Abbreviation	R for Data Science
Course Description	Introduces underlying concepts of the R programming language and R package ecosystem for manipulation, visualization, and modeling of data, and for communicating the results of and enabling replication of their analyses.
Semester Credit Hours/Units	Fixed: 2

Offering Information

Length Of Course	14 Week, 7 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance
<i>Previous Value</i>	<i>No</i>
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: 1350, 1350.01, 1350.02, 1450, 1450.01, 1450.02, 1550, 2450, 2450.01, 2450.02, 2480, 2480.01, 2480.02, 3201, 3202, 3450, 3450.01, 3450.02, 3460, 3470, 3470.01, 3470.02, 4202, 5301, or 5302, or equiv., or permission of instructor.

Previous Value

Prereq: 1350, 1450, 1550, 2450, 2480, 3201, 3202, 3450, 3460, 3470, 4202, 5301, or 5302, or equiv., or permission of instructor.

Exclusions

Electronically Enforced

Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code

27.0501

Subsidy Level

Doctoral Course

Intended Rank

Junior, Senior, 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

- Understanding the basic concepts of the R programming language: expressions, objects, and data types
- Understanding a grammar of graphics and being able to construct visualizations of data
- Being able to efficiently manipulate and organize data
- Being able to apply different numerical techniques for exploring and summarizing data
- Understanding how data is represented, how to import data, the problems that may arise when importing data, and how to handle those problems
- Understanding different programming paradigms and abstractions in R (for example, piping, iteration, and functional programming), and being able to recognize where and when these concepts can be applied
- Being able to use different technologies for dynamically documenting, communicating the results of, and enabling replication of their data analyses with R and R Markdown

Content Topic List

- Data visualization
- Data types and representation
- Data frames and data manipulation
- Data summarization
- Data import and workflows
- Tidy data and relational data
- Functions and control flow
- Strings and factors
- Iteration and functional programming
- Dates and times
- Debugging and performance enhancement

Sought Concurrence

Previous Value

Yes
No

Attachments

- Stat 5730 syllabus in-person.pdf: In-person
(Syllabus. Owner: Craigmile,Peter F)
- ASC DL Course Syllabus_STAT 5730.docx: Online
(Syllabus. Owner: Craigmile,Peter F)
- DL review Stat 5730.docx: DL review
(Other Supporting Documentation. Owner: Craigmile,Peter F)
- concurrence CSE.pdf: CSE Concurrence
(Concurrence. Owner: Craigmile,Peter F)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Craigmile,Peter F	06/05/2020 03:07 PM	Submitted for Approval
Approved	Craigmile,Peter F	06/05/2020 03:09 PM	Unit Approval
Approved	Haddad,Deborah Moore	06/05/2020 04:14 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Vankeerbergen,Bernadette Chantal	06/05/2020 04:14 PM	ASCCAO Approval



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: STAT 5730

INTRODUCTION TO R FOR DATA SCIENCE

SPRING 2021

Course overview

Instructor

Instructor: Sebastian Kurtek

Email address: kurtek.1@stat.osu.edu

Phone number: 614 292 0463

Office hours: Tuesdays 1PM-2PM via Zoom

Office Location: Cockins Hall 440B

Course description

R is a freely available statistical computing environment and programming language. It has become a dominant workhorse for modern statistical research and data analysis, and is being widely adopted in industrial data analytics as well. The primary goal of the course is to teach students how to use R for data analysis: both (1) efficient use of the R computing environment and (2) effective programming in the R language.

There are formal prerequisites for the course. This is a **statistics course**, so the examples and applications demonstrated in the course will be oriented towards data analysis and statistical endeavors. Basic numeracy and familiarity with statistics is expected for motivation and perspective.

Note: This course will be administered 100% online.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Produce dynamic and reproducible reports with R Markdown;

- Visualize various types of data in R using the ggplot2 package;
- Import, manipulate and summarize data in R;
- Use the R tidy package to clean data prior to statistical analysis;
- Write and execute R functions that involve iterations or conditional statements;
- Build interactive apps via the shiny package in R.

Course materials

Required

1. (R4DS) Golemund and Wickham (2016): *R for Data Science*. Electronic version: <http://r4ds.had.co.nz>. This web version of the book can be accessed freely from any web browser.
2. (HoPR) Golemund (2014): *Hands-On Programming with R*. Electronic version: <https://rstudio-education.github.io/hopr/>. This web version of the book can be accessed freely from any web browser.

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

Technology skills necessary for this specific course

- CarmenZoom audio and video meetings
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 8+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed

- Microphone: built-in laptop or tablet mic or external microphone

Necessary software

Students will be required to use RStudio software. RStudio can be downloaded for free at <https://www.rstudio.com/>. Before downloading RStudio, you must also download and install the base R software at <http://www.r-project.org>. You are expected to install R and RStudio on your personal computer by downloading the software from the links above. You will also have to install the packages tidyverse and rmarkdown in R. Further instructions will be provided during the first lecture.

Grading and faculty response

Grades

Category	Percentage
Participation	10%
Homework	30%
Midterm Online Assessment	30%
Final Course Project	30%
Total	100%

See course schedule, below, for due dates

Assignment information

1. *Participation*: You are expected to attend all lectures and actively participate in class discussion. In addition, there will be discussion boards on Carmen that you are **required** to contribute to regularly.
2. *Homework*: Homework will be assigned (approximately) weekly, will be due on announced dates and will be graded. Learning to compute and program requires practice. Homework assignments will mainly consist of exercises designed to reinforce the concepts covered in class during the previous week. You will be allowed to drop one homework score from your grade. I recommend completing all of the homeworks, even if you plan to drop one.
3. *Midterm Online Assessment*: A midterm assessment will take place approximately halfway through the course. Details will be announced in class.

4. *Final Project*: Students will work individually or in small groups on a final project involving the manipulation, exploration, and presentation of data. Details will be announced in class.

Late assignments

If you absolutely need turn in an assignment late and have a valid excuse, please see me for the necessary arrangements. However, you must notify me in advance in such a situation. Exceptions to this policy will be permitted only in extreme situations such as serious injury immediately prior to an assignment being due or severe illness requiring hospitalization.

Grading scale

93–100: A
90–92.9: A-
87–89.9: B+
83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70–72.9: C-
67–69.9: D+
60–66.9: D
Below 60: E

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback

For large weekly assignments, you can generally expect feedback within **14 days**.

E-mail

I will reply to e-mails within **24 hours on school days**.

Discussion board

I will check and reply to messages in the discussion boards every **48 hours on school days**.

Attendance, participation, and discussions

Student participation requirements

Because this is a distance-education course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Logging in: AT LEAST ONCE PER WEEK**
Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours and live sessions: OPTIONAL OR FLEXIBLE**
All live, scheduled events for the course, including my office hours, are optional. For live presentations, I will provide a recording that you can watch later. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.
- **Participating in discussion forums: ONCE PER WEEK**
As participation, each week you are required to post at least once as part of our substantive class discussion on the week's topics.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Other course policies

Student academic services

Student academic services offered on the OSU main campus

<http://advising.osu.edu/welcome.shtml>.

Student support services

Student support services offered on the OSU main campus <http://ssc.osu.edu>.

Academic integrity policy

Policies for this online course

Please help us maintain an academic environment of mutual respect, fair treatment, and personal growth. You are required to produce original and independent work for all assessments. Although students are often encouraged to work together on homework assignments, **all students must submit their own work.**

Ohio State's academic integrity policy

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/>.

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been

sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

Accessibility accommodations for students with disabilities

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

Your mental health!

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org

Course schedule (tentative)

Week	Dates	Topics, Readings, Assignments Due
1	1/11	Topic: Introduction to R, RStudio and R Markdown Reading: R4DS 1.4-1.6, 4, 27.1-27.4.3; HoPR 1-2
2	1/25	Topic: Visualization in R with ggplot2 Reading: R4DS 3, 28
3	2/1	Topic: Data types and representation Reading: HoPR 1, 3-5 Due: Homework 1
4	2/8	Topic: Data frames and data manipulation Reading: HoPR 3-4, R4DS 5.1-5.5, 10 Due: Homework 2
5	2/15	Topic: Data summarization Reading: R4DS 5.6-5.7 Due: Homework 3
6	2/22	Topic: Data import and workflows Reading: R4DS 6-8, 11.1-11.2, 11.6 Due: Homework 4
7	3/1	Online assessment
8	3/8	Topic: Tidy data and relational data Reading: R4DS 12-13 Due: Homework 5
9	3/22	Topic: Functions and conditional execution Reading: R4DS 19, HoPR 6-7 Due: Homework 6
10	3/29	Topic: Dates and times Reading: R4DS 16 Due: Homework 7

11	4/5	Topic: Iteration and functional programming Reading: R4DS 21, HoPR 9 Due: Homework 8
12	4/12	Topic: Dashboards and R Shiny Reading: R4DS 25 Due: Homework 9
13	4/19	Project time
14	4/26	Additional topics time permitting: Strings and factors, Working with many models and list-columns

STAT 5730 Introduction to R for Data Science

lecture: M 12:10pm – 2:00pm in [Arps Hall 012](#)
instructor: Vincent Q. Vu ([vqv at stat osu edu](mailto:vqv@stat.osu.edu))
office: Cockins Hall 428b
office hours: W 1:00pm – 2:50pm, or by appointment
web: Class schedule, assignments, and course announcements will be posted on Carmen (carmen.osu.edu)
prerequisites: STAT 1350, 1450, 1550, 2450, 2480, 3201, 3202, 3450, 3460, 3470, 4202, 5301, or 5302, or equivalent or permission of instructor

1 Overview

R is a freely available statistical computing environment and programming language. It has become a dominant workhorse for modern statistical research and data analysis, and is being widely adopted in industrial data analytics as well. The primary goal of the course is to teach students how to use R for data analysis: both (1) efficient use of the R computing environment and (2) effective programming in the R language.

There are formal prerequisites for the course. This is a *statistics* course, so the examples and applications demonstrated in the class will be oriented towards data analysis and statistical endeavors. Basic numeracy and familiarity with statistics is expected for motivation and perspective. No programming experience is required.

2 Course materials & computing

- Required reading

- (R4DS) Golemund and Wickham (2016): *R for Data Science*. O'Reilly. (web: r4ds.had.co.nz). The web version of the book is can be accessed freely from any web browser. Electronic access to the print version of the book is available at <https://www.safaribooksonline.com/library/view/-/9781491910382/?ar>.

Note that the web and print versions have different chapter numbering.

- (HoPR) Golemund (2014): *Hands-On Programming with R*. O'Reilly. **Note that the web and print versions have different chapter numbering.** Electronic access to the book is available at <https://rstudio-education.github.io/hopr/>
- Print copies of both books can be purchased directly from oreilly.com. After visiting one of the above links, if you sign-up for a O'Reilly account with your OSU email address and install the appropriate app to your iOS or Android device (<https://www.oreilly.com/online-learning/apps.html>), you should be able to download the books for offline access.

- **Software**

- R (www.r-project.org)
- RStudio (www.rstudio.com)

You are expected to be able to access working installations of **current versions** of the required software. RStudio Server login access will be provided to students registered in the course by the Ohio Supercomputer Center (OSC, www.osc.edu). This will allow you to access R via the RStudio IDE from any web browser. Alternatively, you can also install R and RStudio on your personal computer by downloading the software from the links above.

3 Tentative schedule

The following is a tentative schedule of topics. Reading for R4DS refers to the numbering of the web version of the book. We may deviate from this schedule, so pay attention to announcements.

Week	Topic	Due	Reading	Extra Reading
1	Introduction to R, RStudio and R Markdown		R4DS 1.4–1.6, 4, 27.1–27.4.3	HoPR 1–2
2	Visualization in R with ggplot2		R4DS 3, 28.2	R4DS 28
3	No class	HW1		
4	Data types and representation	HW2	HoPR 1, 3-5	
5	Data frames and data manipulation	HW3	HoPR 3-4, R4DS 5.1–5.5, 10	
6	Data summarization	HW4	R4DS 5.6–5.7	
7	Data import and workflows	HW5	R4DS 6,8, 11.1–11.2, 11.6	R4DS 7
8	Exam			
9	Tidy data and relational data		R4DS 12–13	
10	Spring break			
11	Functions and conditional execution	HW6, Project proposal	R4DS 19, HoPR 6–7	
12	Strings and factors	HW7	R4DS 14-15	
13	Iteration and functional programming	HW8	R4DS 21, HoPR 9	
14	Dates and times	HW9	R4DS 16	
15	Working with many models and list-columns	HW10	R4DS 25	
16		Project presentation		

4 Coursework & grading

There will be homework, a midterm exam, and a class project. Grading will be based on the following components:

- 50% Homework (10 assignments, lowest score dropped)
- 25% Exam (in-class)
- 25% Project

Learning to compute and program requires practice and thus homeworks will be assigned on a weekly basis. These will mainly consist of exercises designed to reinforce the concepts covered in class during the previous week. Late homework will not be accepted, however you will be allowed to drop one homework score from your grade. I recommend completing all of the homeworks, even if you plan to drop one.

There will be one in-class exam. It will be open book/internet access, but absolutely no communicating with other humans will be allowed. The format of the exam will consist of conceptual questions as well as some computing and programming problems involving data.

Students will work in small groups on a final project consisting of producing an interactive Shiny app. I will provide a list of topics. Each group will cooperate in the design, development, and making a presentation on the project.

5 Rules and policies

5.1 Attendance

It is the responsibility of students to make up for any material covered in class during any absence.

5.2 Academic misconduct

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/>.

5.3 Disability services

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make

arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Stat 5730

Instructor: Sebastian Kurtek

Summary: Introduction to R For Data Scientists

Standard - Course Technology	Yes	Yes with Revisions	No	Feedback/Recomm.
6.1 The tools used in the course support the learning objectives and competencies.	X			<ul style="list-style-type: none"> Carmen Office 365 R
6.2 Course tools promote learner engagement and active learning.	X			<ul style="list-style-type: none"> Carmen Discussion boards Zoom meetings
6.3 Technologies required in the course are readily obtainable.	X			All are available for free
6.4 The course technologies are current.	X			All are regularly updated
6.5 Links are provided to privacy policies for all external tools required in the course.	X			No external tools are used
Standard - Learner Support				
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it.	X			links to 8HELP for technical support are included
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	X			a
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.	X			b
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.	X			c
Standard – Accessibility and Usability				
8.1 Course navigation facilitates ease of use.	X			Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content.
8.2 Information is provided about the accessibility of all technologies required in the course.	X			Contact information is provided.
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	X			University info is provided.
8.4 The course design facilitates readability	X			
8.5 Course multimedia facilitate ease of use.	X			All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of use by being available through a standard web browser

Reviewer Information

- Date reviewed: 6/5/20
- Reviewed by: Ian Anderson

Notes: Please note somewhere that the class is 100% online. Please remove the reference to CarmenConnect as it is no longer used. List the application for office hours (Zoom) in the contact info.

^aThe following statement about disability services (recommended 16 point font):
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.

^bAdd to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus.
<http://advising.osu.edu/welcome.shtml>

^cAdd to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. <http://ssc.osu.edu>. Also, consider including this link in the “Other Course Policies” section of the syllabus.

Re: Concurrence for STAT 5730 Introduction to R for Data Science

Sivilotti, Paul

Mon 4/1/2019 9:44 AM

To: Lee, Yoonkyung <yklee@stat.osu.edu>;

Hi Yoon--

Our curriculum committee reviewed the proposal. CSE concurs with the course proposal.

Best wishes,
--paul

On Mar 20, 2019, at 10:51 PM, Lee, Yoonkyung <yklee@stat.osu.edu> wrote:

Dear Paul,

We would like to request your concurrence on a new course, STAT 5730 Introduction to R for Data Science. This course is designed for our undergraduate and graduate students as an elective, teaching them skills and underlying concepts of the R programming language and computing environment for data analysis. Attached please find the sample syllabus and our rationale for the course proposal.

Please let me know if you have any questions. We would appreciate getting your response within two weeks.

Thank you!

Yoon

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Yoonkyung Lee
Professor of Statistics
Professor of Computer Science and Engineering (by courtesy)
The Ohio State University

<proposal.pdf> <syllabus.pdf>

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Prof. Paul A. G. Sivilotti Computer Science and Engineering
The Ohio State University 2015 Neil Ave., Columbus OH, 43210
614.292.5835, Fax 292.2911 <http://www.cse.ohio-state.edu/~paolo>

