Term Information

Effective Term	Autumn 2021

General Information

Course Bulletin Listing/Subject Area	Physics
Fiscal Unit/Academic Org	Physics - D0684
College/Academic Group	Arts and Sciences
Level/Career	Graduate, Undergraduate
Course Number/Catalog	5680
Course Title	Big Data Analytics in Physics
Transcript Abbreviation	BigDataAnalytics
Course Description	Provides an introduction to machine learning and advanced algorithms, with an emphasis on practical physics-based applications, using publicly available data sets. The goal is to provide an introduction to Data Science for students who may want to pursue this as a career option and/or apply these techniques in a research environment.
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 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	Enrollment in the Physics or Engineering Physics major; C- or higher in CSE 1222, CSE 1223, Engineering 1281H, or Astronomy 1221; C+ or higher in Physics 1251. Or instructor permission.
Exclusions	
Electronically Enforced	Yes

Cross-Listings

Cross-Listings	

Subject/CIP Code

Subject/CIP Code	40.0801
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

- Understand how to process, clean, and prepare data for further analysis.
- Understand how to visualize data in order to gain insights regarding feature importance.
- Understand and be capable to apply a wide variety of machine learning tools in regression, classification, and clustering, with an emphasis on applications in Physics.
- Design their own machine learning solution to a Physics problem from start to finish.

Content Topic List

- Introduction to Python, manipulating data files, linear regression, classification using support vector machines, the confusion matrix, multi-class classification, decision trees and random forests, logistic regression, using the Ohio SuperComputer;
- Neural networks, multi-layer perceptrons, Siamese Networks, and the iPhone Face Recognition Algorithm.

Sought Concurrence

Yes

Attachments

- Concurrence_Form_Final.pdf

  (Concurrence. Owner: Thaler,Lindsey Nicole)
- BigDataNewSyllabus.pdf

  (Syllabus. Owner: Thaler,Lindsey Nicole)
- Sample_Plan.pdf: Sample 4-year plan

  (Other Supporting Documentation. Owner: Thaler,Lindsey Nicole)
- Curriculum_Map.pdf: Curriculum Map

  (Other Supporting Documentation. Owner: Thaler,Lindsey Nicole)

Comments

- Please upload the updated curriculum map. *(by Humanic,Thomas John on 02/23/2021 09:34 AM)*
- Please upload your updated curriculum map for the BS showing how the new course fulfills what program goal and at what level. *(by Vankeerbergen,Bernadette Chantal on 02/17/2021 05:21 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Thaler,Lindsey Nicole	02/16/2021 09:47 AM	Submitted for Approval
Approved	Humanic,Thomas John	02/16/2021 11:59 AM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	02/17/2021 05:21 PM	College Approval
Submitted	Humanic,Thomas John	02/17/2021 05:48 PM	Submitted for Approval
Approved	Humanic,Thomas John	02/17/2021 06:00 PM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	02/17/2021 09:21 PM	College Approval
Submitted	Humanic,Thomas John	02/18/2021 06:00 AM	Submitted for Approval
Approved	Humanic,Thomas John	02/18/2021 06:02 AM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	02/18/2021 10:32 AM	College Approval
Submitted	Humanic,Thomas John	02/18/2021 12:00 PM	Submitted for Approval
Revision Requested	Humanic,Thomas John	02/23/2021 09:34 AM	Unit Approval
Submitted	Thaler,Lindsey Nicole	02/23/2021 09:36 AM	Submitted for Approval
Approved	Humanic,Thomas John	02/23/2021 09:38 AM	Unit Approval
Approved	Vankeerbergen,Bernadette Chantal	02/23/2021 10:40 AM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Hilty,Michael Vankeerbergen,Bernadette Chantal	02/23/2021 10:40 AM	ASCCAO Approval

Syllabus: Physics 5680, Big Data Analytics in Physics

Course Information

- **Course times:** Tuesdays and Thursdays from 12:40p.m.-2:45 p.m.
- **Credit hours:** 4
- **Mode of delivery:** Distance Learning

Instructor

- **Name:** Richard E. Hughes
- **Email:** hughes.319.@osu.edu
- **Office location:** 3140 PRB

- **Office hours:** By Appointment
- **Preferred means of communication:**
  - My preferred method of communication for questions is **email.**
  - My class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to be sure you receive these messages.

Course Prerequisites

A programming class in Python (preferred), Java, or C++; C+ or higher in Physics 1251; or permission of instructor.

Course Description

This course is an introduction to machine learning and advanced algorithms, with an emphasis (as much as possible) on practical physics-based applications, using publicly available data sets. The goal is to provide an introduction to Data Science for students who may want to pursue this as a career option and/or apply these techniques in a research environment.

Learning Outcomes

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

- Understand how to process, clean, and prepare data for further analysis.
- Understand how to visualize data in order to gain insights regarding feature importance.
- Understand and be capable to apply a wide variety of machine learning tools in regression, classification, and clustering, with an emphasis on applications in Physics.
- Design their own machine learning solution to a Physics problem from start to finish.

How This Online Course Works

Mode of delivery: This course is 100% online. However, students are expected to attend class via CarmenZoom (or other as indicated by instructor) at the scheduled 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.*

Pace of online activities: This course is divided into approximately **weekly modules** that are released a day or so ahead of time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a 4 credit-hour course. According to Ohio State bylaws on instruction (go.osu.edu/credithours), students should expect around 4 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 8 hours of homework (reading and assignment preparation, for example) to receive a grade of [C] average.

Attendance and participation requirements: Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of students' expected participation:

- **Class Attendance**: **required**
  Attendance during scheduled class times is required and will be logged. A small grade will be assigned for attendance.
- **Office hours**: **optional**
  Office hours are optional and are attended as needed by students.
- **Participating in discussion forums**: **none required**

Course Materials, Fees and Technologies

Required Materials and/or Technologies

- Text: Hands-On Machine Learning with Scikit-Learn, Keras & Tensorflow, 2nd Edition, Aurelien Geron ; ISBN: 978-1-492-03264-9

Required Equipment

- **Computer:** A laptop/chromebook/PC (or similar) which provides internet access via a browser. Significant editing will be done in the browser, so a device with a large enough screen and a keyboard are strongly recommended. The operating system for this device is not as important since the coursework will all be accomplished using a browser-based environment (Jupiter notebooks and similar) for all of our programming.
- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

CarmenCanvas Access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device (go.osu.edu/add-device) help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application (go.osu.edu/install-duo) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- Navigating CarmenCanvas (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording a slide presentation with audio narration and recording, editing and uploading video (go.osu.edu/video-assignment-guide)

Other Skills Needed for This Course

- Basic programming skills, which could be in any of a number of different languages, such as C++, java, python, etc. All course assignments will be done in python. Entering into the course after doing a simple online python tutorial would be a good idea!
- Basic knowledge of statistics and probability (such as would be obtained in Physics 3700).

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat**: go.osu.edu/it
- **Phone:** 614-688-4357 (HELP)
- **Email:** servicedesk@osu.edu

Digital Flagship

Digital Flagship is a student success initiative aimed at helping you build digital skills for both college and career. This includes offering an engaging collection of digital tools and supportive learning experiences, university-wide opportunities to learn to code, and a Design Lab to explore digital design and app development. Digital Flagship resources available to help Ohio State students include on-demand tutorials, The Digital Flagship Handbook (your guide for all things tech-related), workshops and events, one-on-one tech consultations with a peer or Digital Flagship staff member, and more. To learn more about how Digital Flagship can help you use technology in your courses and grow your digital skills, visit go.osu.edu/dfresources.

Grading and Faculty Response

How Your Grade is Calculated

Assignment Category	Points
Class assignments	60%
Reading Quizzes	11%
Final Project	29%

See Course Schedule for due dates.

Descriptions of Major Course Assignments

- **Weekly assignments**
  There will be weekly assignments to allow you to practice machine learning concepts from reading and in class jupyter notebooks.

- **Reading Quizzes**
  There will be short online quizzes that will focus on readings and class assignments. If you have done the readings. And the assignments these should be extremely straightforward.

- **Final Project**
  1. Description: The project should be one in which machine learning/advanced algorithms can be brought to bear on an interesting problem, either to "solve" that problem, or at least deliver meaningful insights regarding the problem.
  2. The projects will all be single person projects.
  3. The projects should be science oriented.
  4. The deliverables do not include a final report but instead a working jupyter notebook as well as a single page “Poster” (in ppt/pdf form only).

Academic integrity and collaboration: Your submitted assignments should be your own original work. We do encourage students to help each other understand the material. We also anticipate and encourage students to use online resources such as stackoverflow.com to help them with implementation of parts of various algorithms for their assignments. However, the bulk of each assignment should be unambiguously each student’s own work.

In the final project, you should follow [MLA/APA/Chicago etc.] style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in but no one else should revise or rewrite your work.

Late Assignments

Late assignments will be accepted for reduced credit up to 1 week late, with gradually reduced credit. Quizzes will be available online for a specified window only - there are no makeups. Two quizzes may be dropped

Instructor 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 614-688-4357 (HELP) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact me first through my Ohio State email address. I will reply to emails within **24 hours on days when class is in session at the university**.
- **Class announcements:** I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **seven days**.

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

Other Course Policies

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. A more conversational tone 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.

Academic Integrity Policy

See Descriptions of Major Course Assignments for specific guidelines about collaboration and academic integrity in the context of this online class.

Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's Code of Student Conduct (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's *Code of Student Conduct* is never considered an excuse for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.
If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)
- Eight Cardinal Rules of Academic Integrity (go.osu.edu/cardinal-rules)

Copyright for Instructional Materials

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

All students and employees at Ohio State have the right to work and learn in an environment free from harassment and discrimination based on sex or gender, and the university can arrange interim measures, provide support resources, and explain investigation options, including referral to confidential resources.

If you or someone you know has been harassed or discriminated against based on your sex or gender, including sexual harassment, sexual assault, relationship violence, stalking, or sexual exploitation, you may find information about your rights and options on Ohio State's Title IX website (titleix.osu.edu) or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu. Title IX is part of the Office of Institutional Equity (OIE) at Ohio State, which responds to all bias-motivated incidents of harassment and discrimination, such as race, religion, national origin and disability. For more information, visit the OIE website (equity.osu.edu) or email equity@osu.edu.

Commitment to a Diverse and Inclusive Learning Environment

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

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. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand mental health resources (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at 614- 292-5766**. 24-hour emergency help** is available through the National Suicide Prevention Lifeline website (suicidepreventionlifeline.org) or by calling 1-800-273-8255(TALK). The Ohio State Wellness app (go.osu.edu/wellnessapp) is also a great resource.

Accessibility Accommodations for Students with Disabilities

Requesting Accommodations

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 (SLDS). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

Disability Services Contact Information

- Phone: 614-292-3307
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: Baker Hall 098, 113 W. 12th Avenue

Accessibility of Course Technology

This online course requires use of CarmenCanvas (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.

- CarmenCanvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools
- As you begin your college career, which might eventually involve asking professors to recommend you for graduate programs, jobs, or internships, please be aware that professors are not obligated to write references for any student who asks us. I don't write a reference for a student unless I can write a very positive and specific one. Therefore, your job as a college student is to become the kind of student professors can rave about in recommendations — hardworking, collegial, and intellectually inquisitive and honest. Consider maintaining relationships over time with professors, so that they know you well enough to write for you. Many juniors and seniors tell me they wish they had thought about this during their first year.

Policy on Recommendation Letters

As you begin your college career, which might eventually involve asking professors to recommend you for graduate programs, jobs, or internships, please be aware that professors are not obligated to write references for any student who asks us. I don't write a reference for a student unless I can write a very positive and specific one. Therefore, your job as a college student is to become the kind of student professors can rave about in recommendations — hardworking, collegial, and intellectually inquisitive and honest. Consider maintaining relationships over time with professors, so that they know you well enough to write for you. Many juniors and seniors tell me they wish they had thought about this during their first year.

Course Schedule

The following is a preliminary schedule. If adjustments are needed during the semester, as revised schedule will be posted to the Carmen page and a notice will be made using the Announcements tool in CarmenCanvas. Refer to the CarmenCanvas course for up-to-date due dates.

Week	Chapter/pages	Topic
1	Notes	Python Intro
		Manipulating data files;
		Visualization with matplotlib and plotly
2	Chapter 2, 5	Intro to linear regression; Dealing with missing data;
		test/train splits; feature scaling and categorical data
3	Chapter 3	Intro to Classification using support vector machines;
		The confusion matrix;
		ROC curves and AUC
4		Multi-class classification;
		k-fold validation
5	Chapter 6, 7	Decision Trees and Random Forests;
		Over- and Under-fitting, and the Bias-Variance Tradeoff
		Feature Importance
6	From Notes	Linear Regression and Gradient Descent; writing your own regressor from scratch
		Logistic Regression (write your own from scratch)
7	From Notes	Using the Ohio SuperComputer Center (OSC) batch system;
		Softmax Regression
		Neural Networks from scratch
8	Chapter 10	Introduction to Keras: The Industry Standard Neural Network Library
		Multi-Layer Perceptrons
9	Chapter 14	Convolutional Neural Networks
10	Chapter 17	Project Proposal Due
		Autoencoders; Stacked Autoencoders and Classification
11	Chapter 17	Visualization of learned Features in Neural Networks Adversarial Examples
		Variational Autoencoders
12	Notes, Chapter 16,17	1D Convolutional Neural Networks and Sequences Text Classification
		Project Progess Report Due
13	Notes	Siamese Networks and the iPhone Face Recognition
		Algorithm
14	Chapter 17	Possible Additional topics: Generative Adversarial Networks,
	Chapter 15	Recurrent Neural Networks
		During Exam Week: Project due (no final exam)

Physics Major (Non-Honors Advanced Physics Option)

Year	Autumn Semester	Credit hours	Comment		Spring Semester	Credit Hours	Comment
1	Physics 1250	5	Intro Physics I		Physics 1251	5	Intro Physics I
	Math 1151	5	Calculus I		Math 1152	5	Calculus II
	ASC 1100	1	Survey		CSE 1222°	3	C++ Programming
	Foreign Lang. 1	4			Foreign Lang. 2	4	
	Total Hours	**15**			**Total Hours**	**17**	
2	Physics 2300	4	Mechanics I		Physics 2301	4	Mechanics II
	Physics 2095	1	Seminar		Physics 3700	3	Data Ana. Lab
	Math 2153	4	Calculus III		Math 2415†	3	Diff. Equations
	Foreign Lang. 3	4			Gen Ed	3	
	Gen Ed	3			Gen Ed	3	
	Total Hours	**16**			**Total Hours**	**16**	
3	Physics 5500	4	Quantum I		Physics 5501	4	Quantum II
	Physics 5680**	3	Big Data Analytics		Physics 5400	4	E&M
	Gen Ed	3			Gen Ed	3	
	Gen Ed	3			Gen Ed	3	
	Free Elective◊	3					
	Total Hours	**16**			**Total Hours**	**14**	
4	Physics 5600	4	Stat. Mech.		Physics 5300	4	Theoretical Mech.
	Physics 5700	3	Senior Lab		Physics Elective*	4	
	Gen Ed	3			Gen Ed	3	
	Free Elective◊	3			Free Elective◊	3	
	Total Hours	**13**			**Total Hours**	**14**	

Courses in yellow are only offered in the term shown

Enrollment information can be found at physics.osu.edu/controlled-access-courses

† Math 5520H can be taken in place of Math 2415 and 2568.

** or Physics 6810 (Computational Physics) or Physics 3201H (Holography) or Physics 4700 (Electonics Lab)

* Acceptable Physics Elective include Physics 3470 (optics) or any of the Physics 68xx courses

° or CSE 1223 or Astronomy 1221

◊ Free electives are only required if a student needs to take extra courses in order to reach the minimum 121 credit hour requirement set by the College of Arts and Sciences.

		Physics Major Program Outcomes					
		Undergraduate Physics majors acquire a basic mastery of fundamental areas of physics, from classical mechanics, through electricity and magnetism, and finally to modern physics including quantum mechanics and relativity.	Undergraduate Physics majors develop powerful analytical and problem solving skills in areas involving both physics and mathematics.	Undergraduate Physics majors acquire a basic mastery of experimental physics.	Undergraduate Physics majors have acquired a basic mastery of data reduction and error analysis.	Undergraduate Physics majors effectively communicate their physical understanding both professionally and colloquially (orally and in writing).	Undergraduate majors are apprised of and encouraged to participate in academic research, industrial research and/or outreach activities which are consistent with their interest, ability and postgraduate plans.
required courses	Physics 2095: Physics Seminar						3
	Physics 2300: Mechanics I	3	3	1			
	Physics 2301: Mechanics II	3	3	1			
	Physics 3700: Data Analysis Lab	1	3	3	3	3	1
	Physics 5400: Electromagnetism	3	3				
	Physics 5500: Quantum Mechanics	3	3				2
	Physics 5700: Physics Senior Lab	2	3	3	3	3	
required 3rd lab (choose 1)	Physics 3201H: Holography	2	3	3		2	
	Physics 4700: Electonics Lab	2	3	3	2	3	2
	Physics 5680: Big Data Analytics	1	3	2	3	1	2
	Physics 6810: Computational Physics	1	3	2	2	2	2

Relationship: 1 light, 2 intermediate, 3 high

The Ohio State University
College of the Arts and Sciences Concurrence Form

The purpose of this form is to provide a simple system of obtaining departmental reactions to course requests. **An e-mail may be substituted for this form.**

An academic unit initiating a request should complete Section A of this form and send a copy of the form, course request, and syllabus to each of the academic units that might have related interests in the course. Units should be allowed two weeks to respond to requests for concurrence.

Academic units receiving this form should respond to Section B and return the form to the initiating unit. Overlap of course content and other problems should be resolved by the academic units before this form and all other accompanying documentation may be forwarded to the Office of Academic Affairs.

A. Proposal to review

Physics 5680: Big Data Analytics in Physics

Initiating Academic Unit Course Number Course Title

New — 2/13/2020

Type of Proposal (New, Change, Withdrawal, or other) — Date request sent

Computer Science & Engineering — 2/28/2020

Academic Unit Asked to Review — Date response needed

B. Response from the Academic Unit reviewing

Response: include a reaction to the proposal, including a statement of support or non-support (continued on the back of this form or a separate sheet, if necessary).

On behalf of the CSE Curriculum Committee I am happy to offer concurrence for Physics 5680, "Big Data Analytics in Physics."

Signatures

	Name	Position	Unit	Date
1.	Teodoresan	Chair, Curriculum Comm	CSE	02/17/20
2.				
3.				

Revised 5/27/14