APPROVAL FORM FOR

DEGREE PROGRAMS

MISSISSIPPI STATE UNIVERSITY

NOTE: This form is a cover sheet that must accompany the degree program change proposal. The actual proposal should be prepared in accordance with format requirements provided in the *Guide and Format for Curriculum Proposals* published by the UCCC. Both cover sheet and proposal should be submitted to UCCC Mail Stop 9702 (281 Garner Hall), Phone: 325-9410.

College: Academic Affairs **Department:** Data Science Program

Contact Person: Lynn Taylor **Mail Stop:** 9545 **E-mail:** clj19@msstate.edu

Nature of Change: Proposing a new undergraduate minor

Date Initiated: January 26, 2023 **Effective Date:** Fall 2023

Current Degree Program Name: n/a
Major: n/a **Concentrations**: n/a

New Degree Program Name: Minor in Data Science
Major: n/a **Concentration:** n/a

Summary of Proposed Changes:
Request to approve an undergraduate minor in data science.

Approved:	**Date:**
Mimmo Parisi Digitally signed by Mimmo Parisi Date: 2023.01.26 14:26:10 -06'00'	
Department Head	
Dana Pomykal Franz Digitally signed by Dana Pomykal Franz Date: 2023.02.01 10:07:43 -06'00'	
Director of Academic Quality	
Kimberly R. Hall Digitally signed by Kimberly R. Hall Date: 2023.02.01 10:46:41 -06'00'	
Chair, College or School Curriculum Committee	
Jamie Dyer Digitally signed by Jamie Dyer Date: 2023.02.01 10:53:35 -06'00'	
Dean of College or School	
Chair, University Committee on Courses and Curricula	
N/A	
Chair, Graduate Council (if applicable)	
Chair, Deans Council	

NEW DEGREE OUTLINE FORM

PROPOSED New Degree	
Degree: Minor Major: Data Science	
The proposed 19-hour minor in Data Science will provide interested students with an overview of data science as both a field of study and an industry sector. The minor draws from courses within the 64 hours of core Bachelor of Science in Data Science coursework. Students will complete four courses that provide: an introduction to the field, preparation in computer programming, an introduction to data visualization, and specific instruction in statistics. Three labs will provide hands-on experience in managing and using data throughout the data lifecycle as students work with real-world data. Note: Because data science is usually practiced within a specific subject matter area, students are also encouraged to work within their major departments to identify a research methodology or analysis class that will provide subject-matter-specific instruction in applying data science.	
Proposed Curriculum Outline	Required Hours
DSCI 2013 Data Science Literacy Introduction to data science as a field that represents the world and society through data objects, extracts new knowledge from these data objects, and creates artificially intelligent systems that perform tasks while producing further insights that improve the performance of institutions, organizations, businesses, and society.	3
CSE 1284 Introduction to Computer Programming Introductory problem solving and computer programming using object-oriented techniques. Theoretical and practical aspects of programming and problem solving.	4
DSCI 4013 Data Visualization Course providing theoretical foundation for data visualization. Deals with external representation and interactive manipulation of information, data, or artifacts using digital tools to enhance communication, analytical reasoning, and decision-making.	3
DSCI 2012 Data Science Lab – Data Wrangling Practical application of data science tools to clean, format, and work with data.	2
MA/ST 3123 Statistical Inference Basic concepts and methods of statistics, including descriptive statistics, probability, random variables, sampling distribution, estimation, hypothesis testing, introduction to analysis of variance, simple linear regression.	3
Choose two of the following labs: **DSCI 2022 Data Science Lab – Cloud, High-Performance, and Quantum Computing** Hands-on use of cloud GPU/TPU, high-performance, or quantum computing platforms to perform computing tasks for big data analysis tasks. **DSCI 3012 Data Science Lab – Description, Analysis, and Inference** Hands-on programming work to use descriptive, inferential, predictive, and prescriptive statistical techniques with a variety of data types. **DSCI 3022 Data Science Lab – Data Visualization** Hands-on use of tools and programming libraries to visualize data using common approaches to the visual display of numerical, conceptual, and geospatial information.	4

DSCI 3032 Data Science Lab – Artificial Intelligence Hands-on use of artificial intelligence and machine-learning libraries to train models in areas such as natural language processing, computer vision, and classification.	
Total Hours	19

JUSTIFICATION

Students pursuing a minor in Data Science at Mississippi State will have the opportunity to develop the knowledge and skills necessary to begin applying data science expertise in the context of ongoing digital transformation. Digital transformation is the process by which the physical world blends with or gets replaced by the digital world. An organization achieves digital transformation when Artificial Intelligence (AI) becomes an integral part of its operations. Yet AI cannot work without data.

In a digitally transformed world, data are the new oil, the necessary resource to power Artificial Intelligence (AI) and to extract new knowledge to advance human progress. Data and AI are changing the way we live, work, and learn. Data and AI are also broadly impacting public and private sector activity, from health and education to industrial and service sectors. As organizations and businesses turn to data solutions and AI strategies, in addition to creating new positions directly relating to the practice of data science, they seek data-science literate individuals for many positions. In response to digital transformation, data science is a new emerging field that explores and advances methods, systems, and processes to:

1. Represent the world as data objects;
2. Extract insights about the world from these data objects and turn these insights into discoveries, decisions, and actions; and
3. Create smart systems to perform tasks that have historically required human cognition and human decision-making abilities.

The minor in Data Science is a 19-hour interdisciplinary, inter-college minor that includes three general areas of coursework: data science proper, statistics, and computer science. The overall curriculum is designed to provide students with a secondary specialization that complements many programs by providing the student with data science literacy, core data science knowledge, and the opportunity to apply data science methods in the context of hands-on labs. The student will be prepared to work in a professional context in which data science drives processes and strategy, and in which data are used to build smart systems.

SUPPORT: Letters of support from the University Data Science Committee, Department Head of Computer Science, and Department Head of Mathematics

PROPOSED 4-LETTER ABBREVIATION: DSCI

EFFECTIVE DATE: Fall 2023

CIP NUMBER: 30.7001

MISSISSIPPI STATE UNIVERSITY

DATA SCIENCE
133 Etheredge Hall
Mississippi State, MS 39762

P. 662.325.3168

January 26, 2023

Dear Dr. Perkins,

The University Data Science Committee is pleased to support the proposal for an undergraduate minor in Data Science. The committee members unanimously approve of the proposal, which will offer an important opportunity for a wide range of undergraduate students across the disciplines to enhance their training in data science and prepare them for a variety of career paths.

Please see the attached signature sheet for the committee members' endorsement of the proposal.

Sincerely,

Melanie Loehwing
Chair, University Data Science Committee

TO: Dr. Andy Perkins Chair, University Committee on Courses and Curricula
FROM: University Data Science Committee

RE: Approval of Minor in Data Science

DATE: November 30, 2022

This letter of support is offered by the University Data Science Committee in support of the Minor in Data Science proposal.

Sincerely,
University Data Science Committee Members

Melanie Loehwing, Chair

Kimberly Hall, Curriculum Subcommittee Chair

Bimal Balakrishnan

Jonathan Barlow

Brad Brazzeal

Will Davis

Stephen France

Dan Gadke

Alta Knizley

Duane McLemore

Bindu Nanduri

Mimmo Parisi

Andy Perkins

Mohammad Sepehrifar

Bruno Kanieski da Silva

David Smith

Guiming Wang

Merrill Warkentin

Li Zhang

Xin Zhang

MISSISSIPPI STATE UNIVERSITY™
JAMES WORTH
BAGLEY
COLLEGE OF ENGINEERING

DEPARTMENT OF
COMPUTER SCIENCE & ENGINEERING

Andy D. Perkins, Ph.D.
Professor and Associate Department Head
perkins@cse.msstate.edu

November 28, 2022

Dr. Parisi:

The Department of Computer Science and Engineering supports the attached proposal for an undergraduate minor in Data Science.

Sincerely,

Andy D. Perkins, PhD
Professor and Associate Department Head

MISSISSIPPI STATE
UNIVERSITY

COLLEGE OF ARTS & SCIENCES
Department of Mathematics & Statistics

P.O. Box MA
410 Allen Hall
Mississippi State, MS 39762

P. 662.325.3414
F. 662.325.0005

www.math.mssrate.edu

Dear Dr. Perkins and Members of the University Committee on Courses and Curricula:

We are writing to support the Data Science Minor proposal. MA/ST 3123 Statistical Inference will be a core course for students to take to fulfill this minor program.

Please accept this letter of support for the addition of seats for this course.

Sincerely,

Curriculum Committee,
Department of Mathematics and Statistics

---------- Robert Banik

---------- Matt McBride

---------- Chuanxi Qian

---------- Mohammad Sepehrifar

---------- Jon Woody