

COURSE SYLLABUS

# Course Prefix, Number, and Title

INFS 772 Programming for Data Analytics

# Credits

3 Credits

# University Name

Dakota State University

# Academic Term/Year

Spring 2025

## Last date to Drop and receive 100% refund

Jan. 22 (Wed)

## Last date to Withdraw and earn a grade of 'W'

April 7 (Mon)

# Course Meeting Time and Location

# On campus Students: Thu 1:00-3:30 PM TCB 109. For online students, ALL materials are available on D2L and no Meeting Time and Location are needed.

# Instructor Information

## Name

David Zeng

## Office

East Hall 317

## Phone Number(s)

605-215-6041

## Email Address

David.Zeng@dsu.edu

## Office Hours

Mon. Tue. Thu. 11AM-12PM, Mon. Tue. 1-3:30PM

(by appointment)

# Approved Course Description

## Catalog Description

## This course will provide an introduction to programming for data analysis with an emphasis on the analysis of large datasets. The programming language we will use is Python. Python is a general-purpose programming language that's powerful, easy to learn and fast to code. It has a mature and growing ecosystem of open source tools for mathematics and data analysis, and is rapidly becoming the language of choice for scientists and researchers of all stripes. In the first half of the course, students will learn the core of ideas of programming - flow control, input and output, data structures (e.g., arrays, lists, dictionaries), iteration and recursion, classes and object-oriented programming - through writing code to deal with Big Data generated by social media sites such as Twitter. In the second half of the course, students will learn how to use Python for effective data analysis. Specific topics addressed include vector computation and mathematics with NumPy, statistical computation with SciPy, working with tabular data with Pandas, and implementing analytics algorithms using Python.

## Additional Course Information

Popular libraries/platforms such as Streamlit and AI-powered application development (LangChain and OpenAI) will be covered. Python is the programming language we use in the class.

# Prerequisites

## Course Prerequisite(s)

No Prerequisite

## Technology Skills

Students will be required to use email for communication, and Desire2Learn (D2L) as the online course management system. Support for using D2L can be found in the Student Support section.

# Student Learning Outcomes

**Python Fundamentals:** Understand fundamental data structures, objects, functions, and files.

**Python Libraries for Data Analytics:** Understand and able to utilize Numpy and Pandas for basic tasks of data analytics work.

**Scikit-learn:** Understand and able to utilize Scikit-learn to build and train predictive models for data analytics.

**TensorFlow/Keras:** Understand and able to utilize TensorFlow/Keras to build and train deep neural network models for AI/machine learning work.

**Streamlit:** Able to use Streamlit to build and deploy a machine learning or data analytics app.

**LangChain and OpenAI:** Able to use LangChain and OpenAI models to build and serve a powerful Genetative AI app.

* Get setup with LangChain and LangGraph
* Use the most basic and common components of LangChain: prompt templates, models, and output parsers
* Use LangChain Expression Language, the protocol that LangChain is built on and which facilitates component chaining
* Build a simple application with LangChain
* Build a simple AI agent with LangGraph

# Course Materials

## Required Textbook(s)

1. (PyData) Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, Wes McKinney, O'Reilly Media, 2nd Edition, Chapter 1 - 9.

2. (MLPy) Introduction to Machine Learning with Python, A Guide for Data Scientists, Sarah Guido, Andreas Müller, O'Reilly Media, 2nd Edition, Chapter 1 and 2.

3. (DLPy) Deep Learning with Python, François Chollet, November 2017, ISBN 9781617294433, Chapter 1 and 3.

## Required Supplementary Materials

## <https://scikit-learn.org/stable/tutorial/>

## <https://www.tensorflow.org/tutorials/>

## <https://docs.streamlit.io/get-started>

## <https://python.langchain.com/docs/get_started/quickstart>

## Optional Materials

If you wish to develop and test Python codes, you can install Jupyter Notebook: https://jupyter.org/install

# Course Delivery and Instructional Methods

Students will be given weekly lab assignments, quizzes, and tests online through D2L. The Content link in the D2L site for the course contains tutorial videos that students are expected to follow along with to create the example files shown in the videos before doing the assignments.

Because this is an online class delivered through D2L, it is crucial that you have a working computer and reliable access to the Internet on a regular basis. You should have a backup plan if needed, as a computer that is not working or the inability to connect to the Internet are not valid excuses for missing a submission deadline.

I will be available most afternoons and evenings to answer questions. Email is my preferred form of communication and I check regularly throughout the day. While I cannot guarantee you an immediate answer to your inquiry, I will always do my best to reply in a timely manner. Unless something happens unexpectantly, you should receive a reply from me within 12 hours (or within a few hours if it is during the day).

# Communication and Feedback

## Preferred Email Contact Method

Please use a regular email account to send messages to david.zeng@dsu.edu. Please avoid using D2L Mail for this course.

## Email Response Time

Email inquiries will be answered as soon as possible. Students should never have to wait more than 24 hours to receive an answer to an email question. If a day passes and a student has not received a reply, the student should send another message in case the original was not delivered successfully.

## Feedback on Assignments

Assignment scores and feedback are usually posted on D2L within a day of the deadline. Students may also opt to receive assignment scores via text message and/or email message as soon as the assignment is graded.

## Requirements for Course Interaction

All communication among students in the class and/or with the professor should be courteous and respectful. Please type in complete sentences and use appropriate capitalization and punctuation. If students have questions, it is much easier to reply with an answer if the wording of the question is specific. Please contact the professor for clarification if anything written in an email message or in the assignment instructions is difficult to understand.

# Evaluation Procedures

## Assessments

Assignment & Quiz 1 (15%): Python Fundamentals

Assignment & Quiz 2 (15%): Numpy & Pandas

Assignment & Quiz 3 (15%): Scikit-learn

Assignment & Quiz 4 (15%): TensorFlow/Keras

Streamlit/Gen AI Tutorial and Lab (10%)

LangChain/RAG Tutorial & Lab (10%)

LangGraph/AI Agents Tutorial & Lab (10%)

Course Participation 10%

## Final Examination

No Final Examination

## Performance Standards and Grading Policy

Grading Scale:

% of Points Letter Grade

greater than or equal to 90% A

greater than or equal to 80% and less than 90% B

greater than or equal to 70% and less than 80% C

greater than or equal to 60% and less than 70% D

below 60 % F

# Tentative Course Outline and Schedule

| Week | Date | Topics, Assignments, Quizzes, Tests, Deadlines |
| --- | --- | --- |
| 1 | 1/16 | Course Orientation/Python Environment Installation/Testing |
| 2 | 1/23 | Introduction to Python and Jupyter Notebook/Ch2 |
| 3 | 1/30 | Python Fundamentals: Ch3/Data Structures, Objects, Functions, and Files (Assignment&Quiz 1, 15%, due 2/2) |
| 4 | 2/6 | Python Libraries for Analytics: Ch4&Ch5/Numpy & Pandas (Assignment&Quiz 2, 15%, due 2/16) |
| 5 | 2/13 | Intro to scikit-learn 1: A First Application: Classify Iris Species/MLPy Ch1 |
| 6 | 2/20 | Intro to scikit-learn 2: Linear Models for Classification/MLPy Ch2: p58 - 69 |
| 7 | 2/27 | Intro to scikit-learn 3: Neural Networks/MLPy Ch2: p106 – 119 (Assignment&Quiz 3, 15%, due 3/2) |
| 8 | 3/6 | Intro to TensorFlow/Keras 1: DLPy Ch1/TensorFlow 2 quickstart for beginners |
| 9 | 3/13 | Spring Break |
| 10 | 3/20 | DSU Data Analytics Competition for Course Participation  TBD for online students |
| 11 | 3/27 | Intro to TensorFlow/Keras 2: DLPy Ch3/Basic classification: Classify images of clothing (Assignment&Quiz 4, 15%, due 3/30) |
| 12 | 4/3 | Intro to Streamlit: Streamlit Tutorial & Lab (10%, due on 4/13) |
| 13 | 4/10 | Intro to LangChain |
| 14 | 4/17 | LangChain and Open AI: LangChain RAG Tutorial & Lab (10%, due on 4/20) |
| 15 | 4/24 | Intro to AI Agents with LangGraph |
| 16 | 5/1 | AI Agents with LangGraph: LangGraph/AI Agents Tutorial & Lab (10%, due on 5/4) |

# Student Success Services and Supports

## ADA Accommodations

Dakota State University strives to ensure that physical resources, as well as information and communication technologies, are reasonably accessible to users to provide equal access to all. If you encounter any accessibility issues, you are encouraged to immediately contact the instructor of the course and Dakota State University's Office of Disability Services, which will work to resolve the issue as quickly as possible.

DSU's Office of Disability Services is located in the Learning Engagement Center and can be contacted by calling 605-256-5121 or emailing [dsu-ada@dsu.edu](mailto:dsu-ada@dsu.edu). Students seeking ADA accommodations (such as non-standard note taking or extended time and/or a quiet space taking exams and quizzes) can access the DSU website <https://dsu.edu/student-life/disability-services/index.html> for additional information and the link to the Disability Services Request Form. You will need to provide documentation of your disability and the ADA Coordinator must confirm the need before officially authorizing accommodations.

## DSU Knowledge Base

The DSU Knowledge Base contains links and resources to help students by providing information about the following topics: User Accounts & Passwords, Academic Tools & Resources, Software & Apps Support, WiFi & Network Access, Campus Emergency Alert System, Campus Printing, IT Security & Safe Computing, and the Support Desk (which is there to help both on and off-campus students). The Knowledge Base can be accessed through the link below:

* [DSU Knowledge Base](https://support.dsu.edu/TDClient/KB/)

## D2L Support for Students

The D2L Support for Students site is designed to provide DSU students a D2L support resource center that contains user guides, tutorials, and tips for using the D2L learning environment. The D2L Support for Students site can be accessed through the link below:

* [DSU D2L Support Resources for Students](https://d2l.sdbor.edu/d2l/home/606414)

# Classroom Policies

## Attendance and Make-up Policy

On-campus students are required to attend the on-campus sessions. Online students need to submit the completed assignments by the due dates.

Make-up Policy for Missed Submission Deadlines:

Please do not ask for an extension on an assignment, especially the day it is due or even worse, after the submission deadline has passed.

Late submissions will only be accepted for partial credit within 5 days after the due date. 10% penalty for every day after the due date.

# DSU Policies

## Complaint Procedure

Dakota State University seeks to resolve student concerns and complaints in a fair and prompt manner. Students may file a complaint using the [DSU Concerns and Feedback form](https://dsu.wufoo.com/forms/dsu-concerns-and-feedback/). SARA complaints from out-of-state students may be filed using the procedures noted [here](https://catalog.dsu.edu/content.php?catoid=35&navoid=1632&hl=complaint&returnto=search#student-complaints).

## Grade Appeal Policy

If a student believes the final grade assigned in a course was inappropriate, he/she may appeal that grade by filing a formal grade appeal within 15 days of the start of the next academic session. Please see the [Undergraduate Catalog](https://catalog.dsu.edu/content.php?catoid=35&navoid=1614&hl=grade+appeal&returnto=search#Grade_Appeal_Process) or [Graduate Catalog](https://catalog.dsu.edu/content.php?catoid=36&navoid=1666#grade-appeal-process) for the required process to appeal a final grade.

## Student Verification Statement and Proctoring Policy

Federal law requires that universities verify the identity of students when course materials and/or course assessment activities are conducted either partially or entirely online. A student’s Desire2Learn (D2L) login and password are intended to provide the student with secure access to course materials and are also intended to help the university meet this federal mandate. Some DSU Faculty also require the use of a proctor for exams in distance-delivered (Internet) courses and this requirement provides a second level of student identity verification. Students are responsible for any proctoring fees, if applicable. Finally, an instructor who uses web conferencing technology may require students to use a webcam during exams as another means of student identity verification through voice and visual recognition.

<< For online courses, include the verification method used for the course (i.e., proctoring, portfolio, oral exam, student observation, etc.) >>

# South Dakota Board of Regents Policy Statements

## Freedom in Learning Statement

Under Board of Regents and Regental Institutions policy, student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Discussion and debate are critical to education and professional development. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. While the exploration of controversial topics may be an important component of meeting the student learning outcomes in a course, no student will be compelled or directed to personally affirm, adopt, or adhere to any divisive concepts (as defined in SDCL 13-1-67). Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact their home institution to initiate a review of the evaluation.

## ADA Statement

The Regental Institutions strive to ensure that physical resources, as well as information and communication technologies, are reasonably accessible to users to provide equal access to all. If you encounter any accessibility issues, you are encouraged to immediately contact the instructor of the course and the Office of Disability Services, which will work to resolve the issue as quickly as possible. Please note: if your home institution is not the institution you are enrolled at for a course (host institution), then you should contact your home institution’s Office of Disability services. The disability services at the home and host institution will work together to ensure your request is evaluated and responded to in a timely manner.

## Academic Dishonesty and Misconduct

Cheating and other forms of academic dishonesty and misconduct run contrary to the purposes of higher education and will not be tolerated. Academic dishonesty includes, but is not limited to, AAC Guideline 5.3.A – Syllabi BOR Required Policy Statements (Last Revised 01/2023) Page 2 of 2 plagiarism, copying answers or work done by another student (either on an exam or an assignment), allowing another student to copy from you, and using unauthorized materials during an exam. The Regental Institution’s policy and procedures on cheating and academic dishonesty can be found in your home institution’s Student Handbook and the governing Board of Regents policies can be found in BOR Policy 2:33 and BOR Policy 3:4. The consequences for cheating and academic dishonesty are outlined in policy.

## Acceptable Use of Technology

Acceptable Use of Information Technology Resources: While Regental Institutions strive to provide access to computer labs and other technology, it is the student’s responsibility to ensure adequate access to the technology required for a course. This may include access to a computer (not Chromebooks, iPads, etc.), webcam, internet, adequate bandwidth, etc. While utilizing any of the information technology systems students, faculty and staff should observe all relevant laws, regulations, BOR Policy 7.1, and any institutional procedural requirements.

## Emergency Alert Communication

In the event of an emergency arising on campus under BOR Policy 7:3, your Regental Home Institution will notify the campus community via the emergency alert system. It is the responsibility of the student to ensure that their information is updated in the emergency alert system. The student’s cell phone will be automatically inserted if available and if not, their email address is loaded. Students can at any time update their information in the student alert system.