## Course Information

Course Number: OCNG 669

Course Title: PYTHON FOR GEOSCIENCES

Section: 600

Time: TR 1:30 – 2:45p

Location: OMB 110; Canvas LMS

Credit Hours: 3

### Instructor Details

Instructor: Darren W. Henrichs

Office: Eller O&M Bldg rm 410A

Phone: 979-862-3792

E-Mail: dhenrichs@tamu.edu

Office Hours: Online, TBD

### Course Description

Core language Python programming; scientific programing analysis methods; analysis of large geophysical data sets; plotting geophysical data; interpolation.

### Course Prerequisites

Graduate classification.

### Special Course Designation

None

### Course Learning Outcomes

Students will understand the basic concepts of programming. In particular, they will understand basic Python programming as typically used in the geosciences, that is, for one- and two-dimensional geospatial analysis for scientific applications.   
  
    1.    Read and write data using standard formats,   
    2.    Utilize modern programming techniques including object oriented programming,  
    3.    Plot geophysical data using various projections,   
    4.    Use best practices when plotting data,   
    5.    Identify and remove errors in a data set,  
    6.    Perform a complete analysis of a data set using code,  
    7.    Write programs of varying lengths to execute an analysis.

### Textbook and/or Resource Materials

Required textbook: **None**

Online course materials: https://github.com/snifflesnrumjum/python4geosciences

### Grading Policy

* 70% homework (6 assignments), 5% participation, and 25% final project.
* Standard Letter Grading Scale:
  + A = 90-100%
  + B = 80-89%
  + C = 70-79%
  + D = 60-69%
  + F = <60

Graded Class Participation – Students will receive credit for completing quizzes, answering video questions, and/or responding to discussion topics posted during the course.

Final Projects – This project is meant to be an assignment that will test and utilize the skills taught in this course. This is also supposed to be a ‘fun’ project that permits you to identify a dataset of your choosing and learn something from it. Students will identify a dataset in which they have some interest (e.g. analyze differences in word usage between two authors, highlight popular times of day to stream movies, download data from a buoy (or satellite) and plot maps of the various features). Students will submit a Jupyter notebook file containing all of the code and analysis. **Graduate students** will give a short presentation to the class telling us about their project. This presentation will need to be given over Zoom so that all students can see it. Expected time of presentation (~10 min).

Grading Policy Changes – *Faculty must provide grading policies to students by the first class period. As such, faculty cannot change the course grading policy after the second class session. (See* [*Student Rule 10*](https://student-rules.tamu.edu/rule10/)*.)*

### Late Work Policy

Late homework will not be accepted unless an approved Texas A&M University excuse applies or prior arrangement has been approved. Prior arrangement constitutes approval 24-hours before assignment is due. If prior approval is granted for any reason except an approved University excuse, then a ten-percent penalty per day late will be assessed.

* Late work is accepted with a University-approved excuse*.*
* A penalty of 10% per day late, if not a University-approved excuse.
* Late work is any assignment submitted after the closing deadline listed online.

### Course Schedule

Each module comprises ~2 weeks of material:

* + Module 1 (1/19, 1/25) - Course intro; Python basics - Core language
    - Using Jupyter notebooks. Variables, standard data containers (lists, tuples, dictionaries, etc)
  + Module 2 (2/1, 2/8) – Python basics part II
    - Importing packages, for/while loops, functions. Objects as containers for data and associated functions
  + Module 3 (2/15, 2/22) - Numerical Python
    - Numpy package, vector operations, data types, and array broadcasting.
  + Module 4 (3/1, 3/8) - Basic plotting in Python with matplotlib
    - Overview of the matplotlib plotting package: 1D (line plots, histograms), 2D (contours, pcolor).
  + Module 5 (3/15, 3/22) - 1D time series analysis
    - Pandas package, DataFrames: creation, indexing, averaging
  + Module 6 - (3/29, 4/5) 2D geospatial plotting
    - Cartopy mapping package and shapefiles.
  + Module 7 - (4/12, 4/19) Working with NetCDF
    - xarray: reading and writing NetCDF files locally and over the internet
  + (4/26) - Final project presentations (graduate students)

**List of assignments and exams:**

**Please check the course page in Canvas for exact due dates of assignments.**

Homework 1. Problem set due (approximately) end of module 1.  
Homework 2. Problem set due (approximately) end of module 2.  
Homework 3. Problem set due (approximately) end of module 3.  
Homework 4. Problem set due (approximately) end of module 4.  
Homework 5. Problem set due (approximately) end of module 5.  
Homework 6. Problem set due (approximately) end of module 6.  
Final Project. Due by end of module 7.

      Students are encouraged to use their own data sets for trying out methods in the class.

### Student-Instructor Interaction

Virtual office hours will typically be hosted using Zoom or CANVAS, the program's learning management system. At the start of each semester, in consultation with students, several weekly office hour sessions will be held. These sessions typically use Zoom as it provides the ability for screen sharing and group interactions.

You can also reach me via email or using the CANVAS messaging system. You should expect a response to an email within 24 hours except for times I am physically unable to do so (e.g. during travel periods).

Technology Support

This course is taught using the CANVAS learning management system. To access your course, go to: <https://geosonline.tamu.edu/current-students/>, and click on the “Launch Canvas” button. You will need your Texas A&M University NetID and password to log in. Please be sure you have enrolled in Duo Authentication. For more information regarding Duo, go to: <https://it.tamu.edu/duo/>

If at any time, you need help with CANVAS, you may contact their 24x7 help desk at: 1 (844) 802-4049

Technology Requirements

Students will have access to the requisite software and industry databases required to complete their projects through the Master of Geoscience computer infrastructure provided by the College of Geosciences. Information on accessing these resources is available in CANVAS.

## University Policies

### Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](https://student-rules.tamu.edu/rule07/) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

### Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student’s grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](https://student-rules.tamu.edu/rule07/) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor” ([Student Rule 7, Section 7.4.1](https://student-rules.tamu.edu/rule07)).

“The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence” ([Student Rule 7, Section 7.4.2](https://student-rules.tamu.edu/rule07)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](https://student-rules.tamu.edu/rule24/).)

### Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](https://aggiehonor.tamu.edu/Rules-and-Procedures/Rules/Honor-System-Rules)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at [aggiehonor.tamu.edu](https://aggiehonor.tamu.edu/).

### Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit [disability.tamu.edu](https://disability.tamu.edu/). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

### Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](https://rules-saps.tamu.edu/PDFs/08.01.01.M1.pdf)):

* The incident is reasonably believed to be discrimination or harassment.
* The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University’s goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](https://caps.tamu.edu/) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University’s [Title IX webpage](https://titleix.tamu.edu/).

### Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student’s academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at [suicidepreventionlifeline.org](https://suicidepreventionlifeline.org/).

### COVID-19 Temporary Addendum to Minimum Syllabus Requirements

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Spring 2021 as part of the university’s COVID-19 response.

#### Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

* Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely if that option is available, and should not participate in face-to-face instruction.**
* Face Coverings—[Face coverings](https://rules-saps.tamu.edu/PDFs/34.99.99.M0.03.pdf) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the [Face Covering policy](https://rules-saps.tamu.edu/PDFs/34.99.99.M0.03.pdf) and [Frequently Asked Questions (FAQ)](https://provost.tamu.edu/Menu/News/TAMU-Face-Covering-FAQs) available on the [Provost website](https://provost.tamu.edu/Menu/News/TAMU-Face-Covering-FAQs).
* Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
* Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
* To attend a face-to-face class, students must properly wear an approved face covering If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the [Student Conduct office](https://studentlife.tamu.edu/sco/face-covering-violations/) for sanctions. Additionally, the faculty member may choose to teach that day’s class remotely for all students, or dismiss the class in the case of a traditional face to face lecture.

#### Personal Illness and Quarantine

Students required to quarantine must participate in courses and course-related activities remotely, if that option is available, and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or Illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2](https://student-rules.tamu.edu/rule07/).) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.

#### Copyright and Plagiarism Policy

All materials generated for this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one’s own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without with research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Students Rules, <https://student-rules.tamu.edu/rule20/>