

Diversity in support of diversity: Diversity of offerings of AMS Climate Studies for a diversity of student population

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Abstract

Science education is one of the biggest concerns in modern education within the United States and overseas. This is due mainly to the need of STEM labor and the difficulties experienced everywhere in delivering scientific concepts and critical thinking skills. Additionally, modern societies are undergoing unprecedented social pressure due to rapid accumulating environmental concerns as well as the skyrocketing pricing of education. In this context, this communication intends to present and discuss the findings from five college campuses from diverse locations within the United States for students enrolled in a variety of Earth Science and Meteorology courses supported by materials included in the AMS Studies Climate Course.

1. Motivations

The authors are all alumni of the AMS 2013 Climate Studies Diversity Project Summer Professional Development workshop and presented initial results at the AMS Annual Meeting in Atlanta, Georgia in February 2014. While the student populations of the five campuses involved in this study vary in demographics, students in the study cohort were primarily first generation college attendees and represented a wide range of demographics including a large percentage of Native Hawaiian and Pacific Islanders and students of Filipino decent at one campus as well as large percentages of Hispanic, African – American, and Haitian students at other campuses. The majority of enrolled students are non-science majors and intend to pursue careers in mainly the Liberal Arts, Economics and Communication.



Students and young people nowadays:

- Spent a considerable amount of time connected to the phone.
- Do many activities using smart phone applications.
- Share pictures and stories, selecting the circles of friendships, which might have different levels of overlapping.

Challenges and Pre-conditions

Students looking for GE courses in Science tend to:

- Avoid those with too much quantitative requirements – many of these students are taking remedial mathematics courses.
- Enroll in classes, where the delivery of the content is done in a fashion which is the closest to what they are familiar with from their majors.

Students who decide to enroll in Weather and Climate studies very often:

- Are psychology, social studies, humanities, business, and liberal arts students.
- Are not oriented to start a debate from a physics-oriented statement, rather they might be more sensitive to descriptive statements, which later on might be formulated in terms of law of physics.
- Are not aware of the potential links between weather and climate and the core disciplines of their major's courses.
- Due to academic programs limitations, either they take weather studies (Introduction to Meteorology) or climate studies. In some institutions, weather and climate should be offered as two components of the same course.

Objectives of this Presentation

- To explore the possibilities of implementing Weather and Climate Studies in different educational settings.
- To evaluate the extent students are learning the concepts and connecting them with real scenarios.
- To compare different student bodies across the nation in order to find for similarities and differences pointing to key elements that might facilitate the delivery of these courses to these students.
- To evaluate the feasibility of the geographical-area-motivated curriculum.

2. St. Thomas University, Miami Gardens, FL



St. Thomas University is located in Miami Gardens, in the north-west portion of the Metropolitan Miami area in South Florida. The average enrollment is about 2500 students, and the university is considered a Hispanic Serving institution. St. Thomas University offers both bachelor and master programs. Nearly 40 % of the student body is of Hispanic background, with about 23 % being African-Americans, 15 % White, and 20 % another denominations all combined.

- The course has followed the textbook “Essentials of Meteorology, an invitation to the Atmosphere” by C. Donald Ahrens. The adopted book has been maintained from the very beginning the same and complemented with materials from the AMS online weather and climate studies.
- Students are required to pass three tests, do a presentation at the end of the semester based on a topic connecting the course with areas in which they are majoring in, and complete some term projects.
- Offered either following Ahrens, or adapted to the interest of the cohort (biometeorology oriented, agrometeorology, etc)

MET 1010 (formerly SCI 112)

Weather and Climate studies have been offered as components of a single course, from which students earn 3 credits toward General Education requirements. It has been offered in three different formats:

- Face to face class meetings.
- Online
- Blended – online + face to face meetings.



WeatherBug Schools
by Earth Networks

St. Thomas University is a WeatherBug school, with an automated weather station working 24/7 year round and producing its own weather data.

WeatherBug mesonet along with NWS are the source for weather information nationwide.

Irrespective of the styles used or the instructor, the average performance is a C.

4. University of Texas, El Paso, TX



The University of Texas- El Paso is in the desert Southwest directly on the border of New Mexico and the Mexican state of Chihuahua. UTEP is a research-intensive, doctoral-degree-granting urban university enrolling over 23,000 students, with over 70% of them being Mexican-American. UTEP is a participating university in the NOAA Center for Atmospheric Sciences (NCAS), a consortium of minority-serving institutions serving to train students in fields relevant to NOAA's mission.

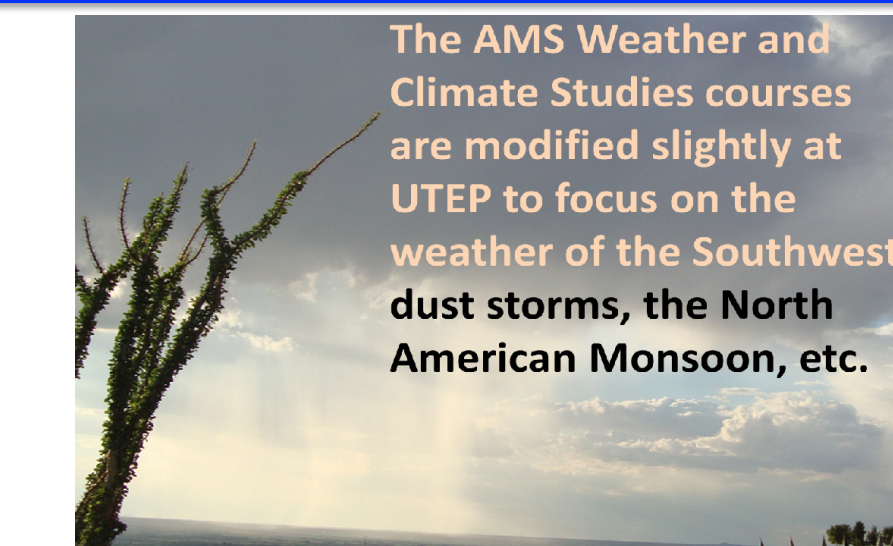
GEOG 3306 (Weather Studies)

GEOG 3306 follows the AMS Weather Studies curriculum and is offered every year during Fall semester in either face-to-face or hybrid format.

GEOG 3308 (Climate Science)

GEOG 3308 follows the AMS Climate Studies curriculum and is offered every year during Spring semester as a face-to-face evening class.

Both are open to students of all majors as a 3-credit science elective, appealing to UTEP's Science Education and Environmental Science majors. In some years a 1-credit, 2-hour lab is added.



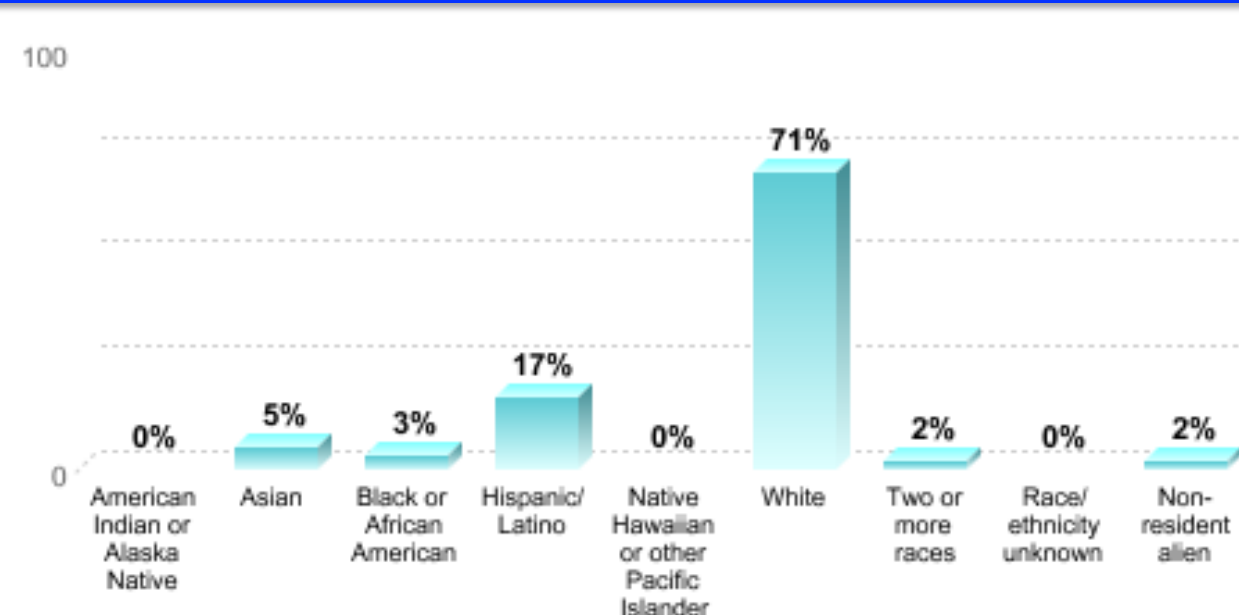
Climate Science students at UTEP may receive higher-level credit by completing additional readings and assignments related to the National Climate Assessment, climate and climate change impacts in the Southwest, etc.

- Guest lectures are presented each term by professional meteorologists/climatologists.
- These courses have impacted over 230 students in the past five years.
- Average student evaluation of AMS courses is 4.5/5, higher than the University average of 4.2 and the instructor's average of 4.4.

6. Texas A & M University, Kingsville, TX



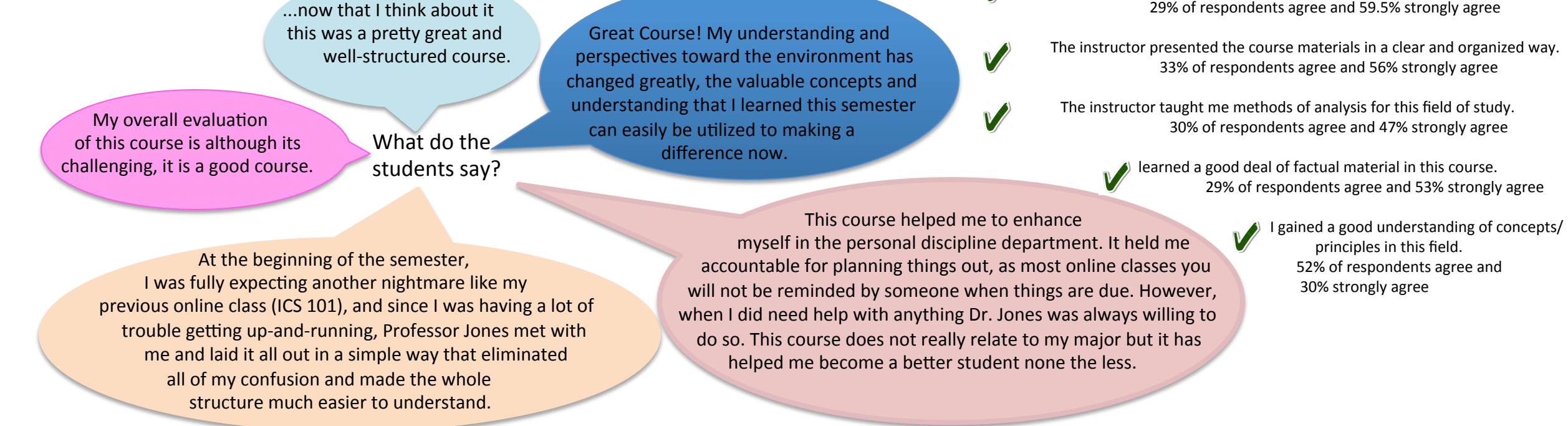
Texas A&M University at Kingsville has offered Online Weather Studies as well as Online Climate Studies with an adapted version from the AMS site. The courses have been delivered from various perspectives including faculty members from the Departments of Physics and Geography. Modules include Computer Laboratory Components with enough interactive activities. Student's feedback is positive and also indicates areas for improvements.



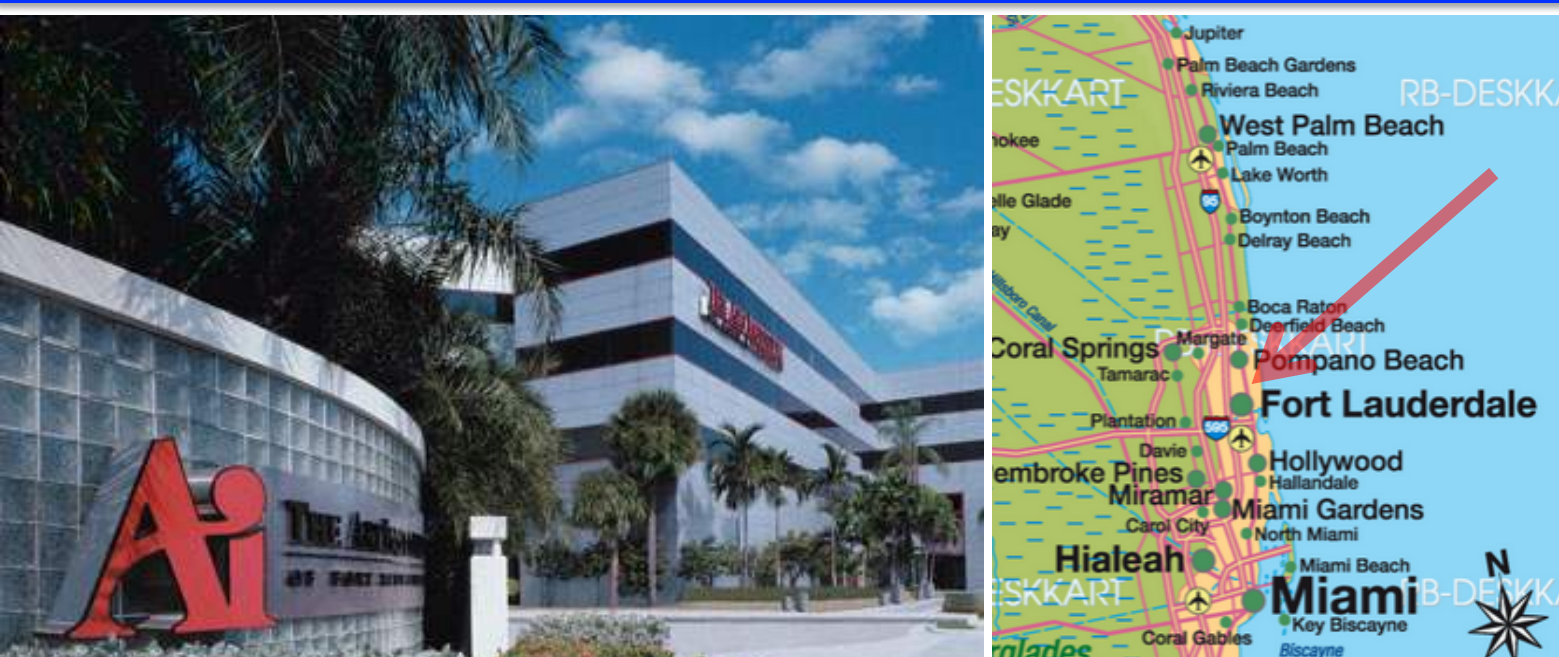
3. University of Hawaii at West O’ahu, HI



UH West O’ahu is located in the City of Kapolei on the island of O’ahu. The average enrollment is about 2,200 students via on-campus and distance learning. The University offers six bachelor’s degree programs in more than 25 areas of study as well as seven certificate programs. Nearly 14% of enrolled students live on the neighbor islands. The average age of students is 27 of which 40% report their ethnicity as Asian, 12% Caucasian, 29% Hawaiian/Pacific Islander, 15% mixed, 4% other.



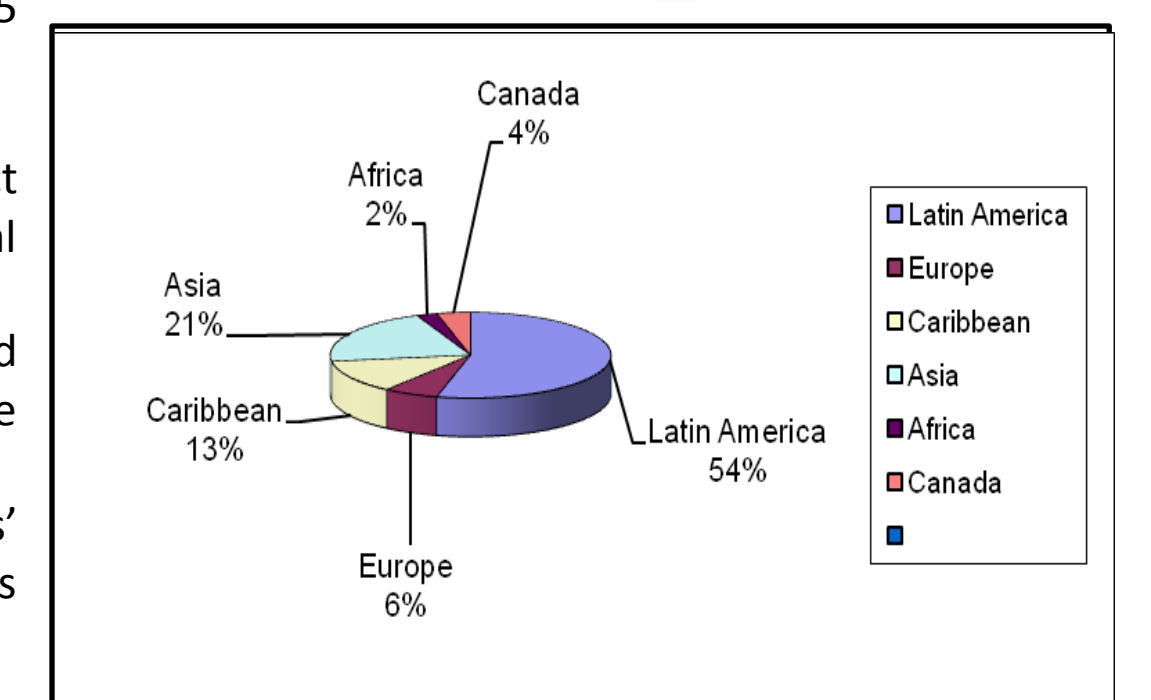
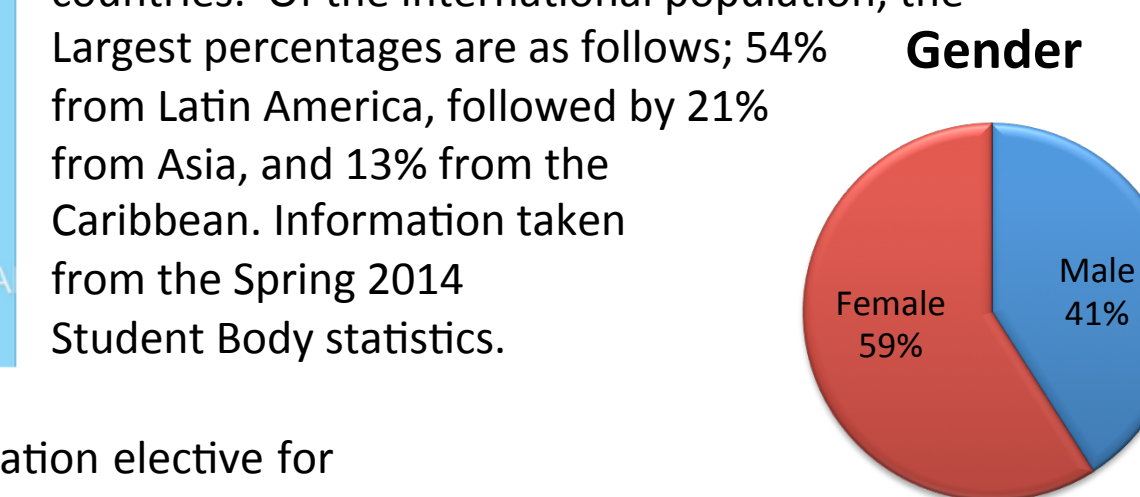
5. The Art Institute of Ft. Lauderdale, FL



MET1001 – Weather and Climate

Weather and Climate is offered as an 11 week, 3-hour science or general education elective for both associates and bachelor's programs at AiFL. The school offers 14 B.S., eight A.S., and 5 diploma programs, all within 4 program areas of study.

- Students are required complete 6 lab assignments, 6 traditional assignments, a final project which ties the major area of study to “weather and climate”, and a comprehensive final exam.
- Traditional assignments are accomplished by selecting a current news worthy weather and climate topic, and relating learned course materials to the topic at hand: Students share topics in an open discussion forum to encourage class wide participation and learning.
- Final projects see students relating the effects of weather and climate to the students' selected industry of study, and bridging the gap between today and tomorrow's expectations of said industry in relation to an evolving climate.



Conclusions

- Weather and Climate studies is feasible to be offered as a General Education component, however there is a broad spectrum of student preparation before taking it.
- Student's background is very important, and one of the most important variables for the success of this course. Student body with remedial mathematics and English very often struggles enough while taking such a course irrespective of the way it is delivered.
- The language used in many weather oriented courses is more oriented to already vocationally oriented students rather than to those with a different style of learning. It would be useful to start from a narrative perspective and steadily to transit to a more technical or physics-oriented language.
- Since in many cases, the student population taking these classes are non science majors, it would be recommended that instructors offering these classes become aware of topics where the impact of the weather might be relevant: weather and economic losses, biometeorology, seasonal affective disorders, chronobiology, epigenetics, etc.
- The course might substantially help in overcoming the educational gap present within minorities and might contribute to engage students in STEM fields.

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