



Intro. to Raster Based GIS-12102

GISC-1421

RT 2022 Section 001 4 Credits 01/18/2022 to 05/15/2022 Modified 01/18/2022

Course Meetings

Course Modality

This class section of GISC 1421 is a Online on a Schedule at this time. However, as it planned originally it will be changed to in-person meetings at a campus location in the future. You will receive an update about it when the college start to go in-person.

Meeting Days

Wednesday

Meeting Times

6:00PM to 8:50PM

Meeting Location

Via Webex

Welcome and Instructor Information

Adjunct Professor: Dr. Thushara Ranatunga

Email: thushara.ranatunga@hccs.edu

What's Exciting About This Course

In this course, you will learn the basic concepts of raster data and the capabilities of raster data in GIS environment. Furthermore, you will be learning how the collection of various formats of raster data works including aerial imageries, satellite imageries and LiDAR point clouds and make geospatial visualization of such data. You will be learning how to work with variety of raster data formats, extract information, spatial modeling, and data visualization techniques. You will be well familiarizing with the ArcGIS mapping package and advanced image processing extensions. This course will introduce you the techniques and algorithms commonly used in photo or image processing.

My Personal Welcome

Welcome to Introduction to Raster Based GIS. My name is Dr. Thushara Ranatunga, an Adjunct Professor of GIS at HCC. I'm delighted that you have chosen this course!

Please read the **rest of this syllabus** for course description, pre-requisites, students learning outcomes, required textbook and instructional material, course assignments/assessments, as well as other course policies (participation, makeup, etc). See also the **Course Calendar on Canvas** for assignments/assessments due dates.

Preferred Method of Contact

As the course progresses, you may encounter challenging ideas or difficulties completing your coursework. I am available to support you. The fastest way to reach me is through Canvas Inbox e-mail. If, for any reason, you can't access Canvas, you can reach me at my HCC e-mail (Thushara.Ranatunga@hccs.edu). The best way to really discuss issues is in person and I'm available before and after classes as well as by appointments to tackle the questions. My goal is for you to walk out of the course with a solid understanding of raster based geospatial data analysis, extract information and visualization. So please contact me by email whenever you have a question.

Office Hours

Wednesday, 6:00 PM to 8:50 PM

Course Overview

Course Description

Instruction in GIS data sets including raster- based information such as images or photographs, acquisition of such data, and processing and merging with vector data.

Department Website

<https://www.hccs.edu/programs/areas-of-study/social--behavioral-sciences/geographic-information-science/>

Student Learning Outcomes and Objectives

Program Student Learning Outcomes (PSLOs)

Students will be able to:

- Demonstrate knowledge of the global natural and cultural environments and the geographic methods by which they are studied.
- Recognize, evaluate, and analyze critical issues that deal with diversity of people, places, and events globally as well as within specific geographic regions.
- Interpret maps and mapped data utilizing basic map elements, including scales, common coordinate systems, and map symbols.
- Use a computer effectively to research, map and analyze geographic information and communicate geographic information. Compare and contrast common geographic technologies such as geographic information systems (GIS) and the global positioning system (GPS).

Course Student Learning Outcomes (CSLOs)

- Relate current capabilities of satellites for collecting images and photographs
- Use GPS hand-held units.
- Summarize processing of imagery to produce a thematic map
- Explain geo-referencing of photos or images to maps
- Operate effectively one or more image processing software packages
- Interpret photos and images to produce map data
- Analyze geographic information collected in raster format
- Merge photographic information correctly in existing raster format
- Output finished maps, documents and reports

Key activities from the industry- validated Geographic Information System Technician Skill Standards

1. Create and/or Acquire GIS Data

1.2 Develop (and document with metadata) database(s) including: defining geometry, attributes, relationships, topology rules, feature

behaviors such as types and domains, incorporating data schema models.

2. Create Image

2.2 Geo-reference digital imagery.

2.3 Rectify images to meet data standards

2.4 Perform image analysis

3. Maintain GIS Data

3.2 Maintain data QA/QC through update operations (add, delete, change)

3.3 Perform layer updates and update metadata (imagery/themes)

3.4 Convert data between formats

4. Conduct Spatial/Non-Spatial Analysis

4.4 Perform geo-processing through clipping, buffering, overlay, etc.

4.7 Interpret data results

5. Generate GIS Products

5.6 Distribute digital and hard copy products

9. Perform Administrative

9.5 Participate in GIS awareness events such as presentations, conferences, and user groups.

10. Pursue Professional Development

10.1 Participate in professional conferences using both oral and written communications

Texas Workforce Investment Council, (n.d). Geographic information System Technician Skill Standards. Texas Workforce Investment Council. Retrieved from http://www.tssb.org/sites/default/files/wwwpages/repos/pdffiles/GIS_TechSS.pdf on October, 1, 2018

Departmental Practices and Procedures

Department Specific Instructor and Student Responsibilities

Add Content Here

Program-Specific Student Success Information

Add Content Here

Instructional Materials and Resources

Instructional Materials

The textbooks listed below are required for this course.

Keranen, K., & Kolvoord, R. (2017). Making spatial decisions using ArcGIS Pro: a workbook, ESRI Press, ISBN: 9781589484856

Digital copy can be rented or purchased from

1. [Vital Source Bookshelf](#)
2. [Scribd](#)

Temporary Free Access to E-Book

Here is the link to get temporary free access to a digital version of the text for fourteen days:

<< [add link] >>

Free Access to Data

<https://www.arcgis.com/home/group.html?id=ec3cdf4367cc448092971f359173424d#overview>

✓ Course Requirements

Assignments, Exams, and Activities

Type	Weight	Topic	Notes
Written Assignments	36%		There will be 10 assignments, and each assignment contributes 3.6% of your final grade (total 36% of your final grade). I highly encourage to complete all 10 assignments and submit them on time to get the full points. Any late assignments will have reduced points. After one week of the due date, no assignment will be accepted, and you will receive 0 points.
Exams/Quizzes	54%		<p>There will be two exams in this course; Midterm and Final Exam. Please refer the course calendar for the exam dates. Midterm will be testing materials cover before the midterm and final will be testing materials cover after the midterm. All exams will be closed-book, closed-notes, proctored exams to be taken in-person. Please see Grading formula for the weight of each exam toward your course grade and see the Course Calendar on Canvas for scheduled exam dates and the time limit for each.</p> <p>Make-up exams will be given <i>only</i> in cases of extenuating circumstances. Extenuating circumstances are unexpected and unavoidable situations such as hospitalization or auto accident. They don't include forgetting about the date of the exam, busy work schedule, etc. You would need to provide documentation to your instructor as soon as possible after the missed assignment/assessment for consideration. Extenuating circumstances will be evaluated by your instructor on a case by case basis. It is your responsibility to contact your instructor with documentation of your situation as soon as possible, schedule a makeup exam, and submit the proper documentation to the department. All missed grades will be recorded as zeros</p>
In-Class Activities	10%		In-class activities include, active participation of lab works followed by the lecture. It is very important every student actively participate in-class activities. Every student expects to complete the lab work along with the instructor assigned to the class day. Your in-class activities will be evaluated and will have a 10% contribution to the final grade. So please don't miss the class, unless its unavoidable and participate the class activities.
Final Exam	30%		Final exam will be testing materials cover after the midterm
Extra Credit			Describe the assignment here.

Grading Formula

Grade	Range	Notes
A	100- 90	
B	89 - 80	
C	79 - 70	
D	69 - 60	
F	59 and below	

* Instructor's Practices and Procedures

Incomplete Policy

Add Content Here

Missed Assignments/Make-Up Policy

Add Content Here

Academic Integrity

Here's the link to the HCC information about academic integrity (Scholastic Dishonesty and Violation of Academic Scholastic Dishonesty and Grievance):

<https://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/student-procedures/>
(<https://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/student-procedures/>)

Attendance Procedures

Add Content Here

Student Conduct

Add Content Here

Instructor's Course-Specific Information

Add Content Here

Devices

Add Content Here

Faculty Statement about Student Success

Add Content Here

Faculty-Specific Information Regarding Canvas

This course section will use Canvas (<https://eagleonline.hccs.edu> (<https://eagleonline.hccs.edu>)) to supplement in-class assignments, exams, and activities.

HCCS Open Lab locations may be used to access the Internet and Canvas. For best performance, Canvas should be used on the current or first previous major release of Chrome, Firefox, Edge, or Safari. Because it's built using web standards, Canvas runs on Windows, Mac, Linux, iOS, Android, or any other device with a modern web browser.

Canvas only requires an operating system that can run the latest compatible web browsers. Your computer operating system should be kept up to date with the latest recommended security updates and upgrades.

Social Justice Statement

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HCC Policies and Information

HCC Grading System

HCC uses the following standard grading system:

Grade	Grade Interpretation	Grade Points
A	Excellent (90-100)	4
B	Good (80-89)	3
C	Fair (70-79)	2
D	Passing (60-69), except in developmental courses.	1
F	Failing (59 and below)	0
FX	Failing due to non-attendance	0
W	Withdrawn	0
I	Incomplete	0
AUD	Audit	0
IP	In Progress. Given only in certain developmental courses. A student must re-enroll to receive credit.	0
COM	Completed. Given in non-credit and continuing education courses.	0

Link to Policies in Catalog and Student Handbook

Here's the link to the HCC Catalog and Student Handbook: <https://catalog.hccs.edu/> (<https://catalog.hccs.edu/>)

In it you will find information about the following:

- Academic Information
- Academic Support
- Attendance, Repeating Courses, and Withdrawal
- Career Planning and Job Search
- Childcare
- disAbility Support Services
- Electronic Devices
- Equal Educational Opportunity
- Financial Aid TV (FATV)
- General Student Complaints
- Grade of FX
- Incomplete Grades
- International Student Services
- Health Awareness
- Libraries/Bookstore
- Police Services & Campus Safety
- Student Life at HCC
- Student Rights and Responsibilities
- Student Services
- Testing

- Transfer Planning
- Veteran Services

Link to HCC Academic Integrity Statement

<https://www.hccs.edu/student-conduct> (<https://www.hccs.edu/student-conduct>) (scroll down to subsections)

Campus Carry Link

Here's the link to the HCC information about Campus Carry:

<https://www.hccs.edu/campuscarry> (<https://www.hccs.edu/campuscarry>)

HCC Email Policy

When communicating via email, HCC requires students to communicate only through the HCC email system to protect your privacy. If you have not activated your HCC student email account, you can go to [HCC Eagle ID \(https://www.hccs.edu/email\)](https://www.hccs.edu/email) and activate it now. You may also use Canvas Inbox to communicate.

Office of Institutional Equity

Use the following link to access the HCC Office of Institutional Equity, Inclusion, and Engagement: <https://www.hccs.edu/eeo> (<https://www.hccs.edu/eeo>)

Ability Services

HCC strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including long and short term conditions, mental health, chronic or temporary medical conditions), please meet with a campus Abilities Counselor as soon as possible in order to establish reasonable accommodations. Reasonable accommodations are established through an interactive process between you, your instructor(s) and Ability Services. It is the policy and practice of HCC to create inclusive and accessible learning environments consistent with federal and state law. For more information, please go to <https://www.hccs.edu/accessibility> (<https://www.hccs.edu/accessibility>)

Title IX

Houston Community College is committed to cultivating an environment free from inappropriate conduct of a sexual or gender-based nature including sex discrimination, sexual assault, sexual harassment, and sexual violence. Sex discrimination includes all forms of sexual and gender-based misconduct and violates an individual's fundamental rights and personal dignity. Title IX prohibits discrimination on the basis of sex-including pregnancy and parental status in educational programs and activities. If you require an accommodation due to pregnancy please contact an Abilities Services Counselor. The Director of EEO/Compliance is designated as the Title IX Coordinator and Section 504 Coordinator. All inquiries concerning HCC policies, compliance with applicable laws, statutes, and regulations (such as Title VI, Title IX, and Section 504), and complaints may be directed to:

David Cross
Director EEO/Compliance
Office of Institutional Equity & Diversity
3100 Main
(713) 718-8271
Houston, TX 77266-7517 or Institutional.Equity@hccs.edu (<mailto:Institutional.Equity@hccs.edu>)

<https://www.hccs.edu/titleix> (<https://www.hccs.edu/titleix>)

Office of the Dean of Students

Contact the office of the Dean of Students to seek assistance in determining the correct complaint procedure to follow or to identify the appropriate academic dean or supervisor for informal resolution of complaints.

<https://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/student-complaints/speak-with-the-dean-of-students/> (<https://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/student-complaints/speak-with-the-dean-of-students/>)

Student Success

Expect to spend at least twice as many hours per week outside of class as you do in class studying the course content. Additional time will be required for written assignments. The assignments provided will help you use your study hours wisely. Successful completion of this course requires a combination of the following:

- Reading the textbook
- Attending class in person and/or online
- Completing assignments
- Participating in class activities

There is no short cut for success in this course; it requires reading (and probably re-reading) and studying the material using the course objectives as a guide.

Canvas Learning Management System

Canvas is HCC's Learning Management System (LMS), and can be accessed at the following URL:

<https://eagleonline.hccs.edu> (<https://eagleonline.hccs.edu>)

HCCS Open Lab locations may be used to access the Internet and Canvas. For best performance, Canvas should be used on the current or first previous major release of Chrome, Firefox, Edge, or Safari. Because it's built using web standards, Canvas runs on Windows, Mac, Linux, iOS, Android, or any other device with a modern web browser.

Canvas only requires an operating system that can run the latest compatible web browsers. Your computer operating system should be kept up to date with the latest recommended security updates and upgrades.

HCC Online Information and Policies

Here is the link to information about HCC Online classes, which includes access to the required Online Information Class Preview for all fully online classes: <https://www.hccs.edu/online/> (<https://www.hccs.edu/online/>)

Scoring Rubrics, Sample Assignments, etc.

Look in Canvas for the scoring rubrics for assignments, samples of class assignments, and other information to assist you in the course. <https://eagleonline.hccs.edu/> (<https://eagleonline.hccs.edu/>)

Instructor and Student Responsibilities

As your Instructor, it is my responsibility to:

- Provide the grading scale and detailed grading formula explaining how student grades are to be derived
- Facilitate an effective learning environment through learner-centered instructional techniques
- Provide a description of any special projects or assignments
- Inform students of policies such as attendance, withdrawal, tardiness, and making up assignments
- Provide the course outline and class calendar that will include a description of any special projects or assignments
- Arrange to meet with individual students during office hours, and before and after class as required

As a student, it is your responsibility to:

- Attend class in person and/or online
- Participate actively by reviewing course material, interacting with classmates, and responding promptly in your communication with me
- Read and comprehend the textbook
- Complete the required assignments and exams
- Ask for help when there is a question or problem
- Keep copies of all paperwork, including this syllabus, handouts, and all assignments

- Be aware of and comply with academic honesty policies in the [HCCS Student Handbook \(https://www.hccs.edu/studenthandbook\)](https://www.hccs.edu/studenthandbook)

Sensitive or Mature Course Content

In this college-level course, we may occasionally discuss sensitive or mature content. All members of the classroom environment, from your instructor to your fellow students, are expected to handle potentially controversial subjects with respect and consideration for one another's varied experiences and values.

EGLS3

The EGLS³ ([Evaluation for Greater Learning Student Survey System \(https://www.hccs.edu/egls3\)](https://www.hccs.edu/egls3)) will be available for most courses near the end of the term until finals start. This brief survey will give invaluable information to your faculty about their teaching. Results are anonymous and will be available to faculty and division chairs after the end of the term. EGLS³ surveys are only available for the Fall and Spring semesters. -EGLS3 surveys are not offered during the Summer semester due to logistical constraints.

<https://www.hccs.edu/egls3> (<https://www.hccs.edu/egls3>)

Housing and Food Assistance for Students

Any student who faces challenges securing their foods or housing and believes this may affect their performance in the course is urged to contact the Dean of Students at their college for support. Furthermore, please notify the professor if you are comfortable in doing so.

This will enable HCC to provide any resources that HCC may possess.

Student Resources

Tutoring

HCC provides free, confidential, and convenient academic support, including writing critiques, to HCC students in an online environment and on campus. Tutoring is provided by HCC personnel in order to ensure that it is contextual and appropriate. Visit the [HCC Tutoring Services \(https://www.hccs.edu/tutoring\)](https://www.hccs.edu/tutoring) website for services provided.

Libraries

The HCC Library System consists of 9 libraries and 6 Electronic Resource Centers (ERCs) that are inviting places to study and collaborate on projects. Librarians are available both at the libraries and online to show you how to locate and use the resources you need. The libraries maintain a large selection of electronic resources as well as collections of books, magazines, newspapers, and audiovisual materials. The portal to all libraries' resources and services is the HCCS library web page at <https://library.hccs.edu> (<https://library.hccs.edu/>).

Supplementary Instruction

Supplemental Instruction is an academic enrichment and support program that uses peer-assisted study sessions to improve student retention and success in historically difficult courses. Peer Support is provided by students who have already succeeded in completion of the specified course, and who earned a grade of A or B. Find details at <https://www.hccs.edu/supplemental-instruction> (<https://www.hccs.edu/supplemental-instruction>)

Resources for Students:

<https://www.hccs.edu/covid19students> (<https://www.hccs.edu/covid19students>)

Basic Needs Resources:

<https://www.hccs.edu/support-services/counseling/hcc-cares/basic-needs-resources/> (<https://www.hccs.edu/support-services/counseling/hcc-cares/basic-needs-resources/>)

Student Basic Needs Application:

<https://www.hccs.edu/basicneeds> (<https://www.hccs.edu/basicneeds>)

COVID-19

Here's the link to the HCC information about COVID-19:

<https://www.hccs.edu/covid-19> (<https://www.hccs.edu/covid-19>)

Instructional Modalities

In-Person (P)

Safe, face-to-face course with scheduled dates and times

Online on a Schedule (WS)

Fully online course with virtual meetings at scheduled dates and times

Online Anytime (WW)

Traditional online course without scheduled meetings

Hybrid (H)

Course that meets safely 50% face-to-face and 50% virtually

Hybrid Lab (HL)

Lab class that meets safely 50% face-to-face and 50% virtually

Copyright Statement

In order to uphold the integrity of the academic environment and protect and foster a cohesive learning environment for all, HCC prohibits unauthorized use of course materials. Materials shared in this course are based on my professional knowledge and experience and are presented in an educational context for the students in the course. Authorized use of course materials is limited to personal study or educational uses. Material should not be shared, distributed, or sold outside the course without permission. Students are also explicitly forbidden in all circumstances from plagiarizing or appropriating course materials. This includes but is not limited to publically posting quizzes, essays, or other materials. This prohibition extends not only during this course, but after. Sharing of the materials in any context will be a violation of the HCC Student Code of Conduct and may subject the student to discipline, as well as any applicable civil or criminal liability. Consequences for unauthorized sharing, plagiarizing, or other methods of academic dishonesty may range from a 0 on the specified assignment and/or up to expulsion from Houston Community College. Questions about this policy may be directed to me or to the Manager of Student Conduct and Academic Integrity.

Course Calendar

Syllabus Modifications

The instructor reserves the right to modify the syllabus at any time during the semester and will promptly notify students in writing, typically by e-mail, of any such changes.

When	Topic	Notes
01/19/2022 Week 1	Class Introduction & Introduction to Raster Data	
01/26/2022 Week 2	How to Use Raster Data in ArcGIS	In Class Exercise: Course Pack 1 Assignment 1 – How to use Raster Data
02/02/2022 Week 3	Spatial Interpolation	In Class Exercise: Course Pack 2

When	Topic	Notes
02/09/2022 Week 4	Remote Sensing in GIS	In Class Exercise: Course Pack 3
02/16/2022 Week 5	Composite Images	In Class Exercise: Project 1: Creating Multispectral Imagery of the Chesapeake Bay Assignment 2 - Project 2: Multispectral Composite bands of the Las Vegas Area
02/23/2022 Week 6	Unsupervised Classification	In Class Exercise: Project 1: Calculating Unsupervised Classification of the Chesapeake Bay Assignment 3 – Project 2: Calculating Unsupervised Classification of Las Vegas, Nevada
03/02/2022 Week 7	Supervised Classification	In Class Exercise: Project 1: Calculating Supervised Classification of the Chesapeake Bay Assignment 4 - Project 2: Calculating Supervised Classification of Las Vegas, Nevada
03/09/2022 Week 8	Midterm Exam	
03/16/2022	No Class	Spring Break
03/23/2022 Week 9	LiDAR in ArcGIS Pro	In Class Exercise - Project 1: Baltimore, Maryland Assignment 5 - Project 2: San Francisco
03/30/2022 Week 10	Location of Solar Panels	In Class Exercise - Project 1: James Madison University Assignment 6 - Project 2: San Francisco University
04/06/2022 Week 11	Forest Vegetation Height	In Class Exercise - Project 1: George Washington National Forest, Virginia Assignment 7 - Project 2: Michaux State Forest, Pennsylvania
04/13/2022 Week 12	Volumetric Analysis & Shadow Maps	In Class Exercise - Project 1 - Baltimore, Maryland Assignment 8 - Project 2: San Francisco
04/20/2022 Week 13	Surging Seas	In Class Exercise - Project 1: Baltimore, Maryland Assignment 9 - Project 2: San Francisco
04/27/2022 Week 14	Shoreline change after Hurricane Sandy	In Class Exercise - Project 1 - Baltimore, Maryland Assignment 10 - Project 2: San Francisco
05/04/2022 Week 15	Raster data in online applications and Course revision	
05/11/2022 Week 16	Final Exam	

Additional Information

Departmental/Program Information

The Geographic Information Science program is designed to challenging a student to understand the complexities of introductory topics in the field of Geographic Information System (GIS) in order to sufficiently prepare them for a rewarding career or higher level of education. GIS provides the opportunity for students to gain a spatial and holistic perspective to demonstrate thorough

and accurate knowledge of the complexities of social and environmental issues, along with the interconnectedness of humans, the natural environment, and spatial analysis tools.

Student Clubs:

The [Anthropology and Geography Club \(https://hccs.presence.io/organization/anthropology-and-geography-club\)](https://hccs.presence.io/organization/anthropology-and-geography-club) promotes awareness of anthropology and geography within and outside of HCCS. The club also provides support for students interested in continuing their formal education in the areas of anthropology and geography.

Process for Expressing Concerns about the Course

If you have concerns about any aspect of this course, please reach out to your instructor for assistance first. If your instructor is not able to assist you, then you may wish to contact the Department Chair.

Anthropology & Geography-GIS Department Chair

Ramin Zamanian

Ramin.Zamanian@hccs.edu

713-718-2869

Student Grievance Procedures:

<https://www.hccs.edu/about-hcc/procedures/student-rights-policies--procedures/>