

**Geographic Information Science Program**  
**Anthropology and Geography Department**

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**GISC 1421: Introduction to Raster Based GIS | #11981**

Fall 2021 | 16 Weeks (08.23.2021-12.12.2021)

Hybrid | Online | Wed 6 p.m.- 8:50 p.m.

4 Credit Hours | 96 hours per semester

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**Instructor Contact Information**

Instructor: Thushara Ranatunga, Ph.D.  
Office: N/A  
HCC Email: Thushara.Ranatunga@hccs.edu

Office Phone: 713-718-2473  
Office Hours: By Appointment via Email

Please feel free to contact me concerning any problems that you are experiencing in this course. Your performance in my class is very important to me. I am available to hear the concerns and just to discuss course topics.

**Instructor's Preferred Method of Contact**

Via HCC Email.

I will respond to emails within 24 hours Monday through Friday; I may reply to weekend messages depending on my time availability and urgency of the request.

**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.

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](mailto: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.

### **Prerequisites and/or Co-Requisites**

GIS 1411 or Department Approval

Please carefully read and consider the repeater policy in the [HCCS Student Handbook](#).

### **Canvas Learning Management System**

This section of GIS 1421 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. **USE FIREFOX OR CHROME AS THE INTERNET BROWSER.**

### **HCC Online Information and Policies**

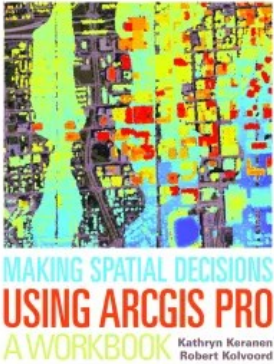
Here is the link to information about HCC Online classes including the required Online Orientation for all fully online classes: <http://www.hccs.edu/online/>

### **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/login/ldap>

# Instructional Materials

## Textbook Information



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 Data

Here is the link to get temporary free access to Data:

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

## Note About Our Course Instruction Mode

This semester, there are four primary modalities for GIS courses: Flex Campus, Lab, Online Anytime, and Online on a Schedule.

This class section of GISC 1421 is a Online on a Schedule course and meets on Wednesday from 6:00PM to 8:50PM

Online on a Schedule classes are online courses with traditional meeting components; coursework is online, and there are specific times to log in for scheduled class meetings.

### 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](#) 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 <http://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 <http://www.hccs.edu/resources-for/current-students/supplemental-instruction/>.

## **Course Overview**

GISC 1421 introduces the fundamental concepts related to current capabilities of satellites for collecting images and photographs; summarize processing of imagery to produce a thematic map. Georeferencing 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; and merge photographic information correctly in existing raster formats.

### **Program Student Learning Outcomes (PSLOs)**

The student will be able to:

1. Relate current capabilities of satellites for collecting images and photographs; (SCANS: F1,F2)
2. Summarize processing of imagery to produce a thematic map;(SCANS: F1, F2)
3. Explain geo-referencing of photos or images to maps;(SCANS: F2)
4. Operate effectively one or more image processing software packages;(SCANS: W3, W4, W5)
5. Interpret photos and images to produce map data;(SCANS: W2, F3)
6. Analyze geographic information collected in raster format;(SCANS: W2, F3)
7. Merge photographic information correctly in existing raster formats; (SCANS: W2, F3)
8. Output finished maps, documents and reports. (SCANS: W1, F2, F3)

### **Course Student Learning Outcomes (CSLOs)**

Upon completion of GISC 1401, the student will be able to:

1. Relate current capabilities of satellites for collecting images and photographs; (SCANS: F1,F2)
2. Use GPS hand-held units.
3. Summarize processing of imagery to produce a thematic map;(SCANS: F1, F2)
4. Explain geo-referencing of photos or images to maps;(SCANS: F2)
5. Operate effectively one or more image processing software packages;(SCANS: W3, W4, W5)
6. Interpret photos and images to produce map data;(SCANS: W2, F3)
7. Analyze geographic information collected in raster format;(SCANS: W2, F3)
8. Merge photographic information correctly in existing raster formats; (SCANS: W2, F3)
9. Output finished maps, documents and reports. (SCANS: W1, F2, F3)

### **Learning Objectives**

Using the knowledge gained in class lecture and labs, and based on any personal or professional interests, the student will be able to:

1. Create and/or Acquire GIS Data
  - a. 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 Data
  - a. Geo-reference digital imagery (Accessed)
  - b. Rectify images to meet data standards.
  - c. Perform image analysis (classification)
3. Maintain GIS Data
  - a. Maintain data QA/QC through update operations: (add/delete/change)
  - b. Perform data layer updates and update metadata (imagery/themes)
  - c. Convert data between formats
4. Conduct Spatial/Non-Spatial Analysis
  - a. Create analysis models through flowcharts and processes
  - b. Perform Geoprocessing through clipping, buffering, overlay, etc.
  - c. Generate descriptive and spatial statistics.
  - d. Interpret data results
5. Generate GIS Products
  - a. Distribute digital and hard copy products
6. Develop Software Applications
  - a. Create map Templates (Accessed)
  - b. Create help files and support documentation
7. Perform Administrative Tasks
  - a. Participate in GIS awareness events such as presentations, conferences and user groups.
8. Pursue Professional Development
  - a. 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/pdfiles/GIS\\_TechSS.pdf](http://www.tssb.org/sites/default/files/wwwpages/repos/pdfiles/GIS_TechSS.pdf) on October, 1, 2018

## 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 class assignments. The assignments provided will help you practice the concepts discussed in class lectures. 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 studying the material and more importantly completing the programming assignments.

## 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 assignments
- Inform students of policies such as attendance, withdrawal, tardiness, and making up assignments
- Provide the course outline and class calendar
- Arrange to meet with individual students as needed

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

# Assignments, Exams, and Activities

## Assignment

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

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.

Make-up exams will be given *only* 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

## In-Class Activities

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.



## Grading Formula

Assignments – 36%  
Midterm – 24%  
Final Exam - 30%  
Lab Exercises - 10%

### HCC Grading Scale:

Grade	GPA Points
A = 100- 90	4 points per semester hour
B = 89 - 80:	3 points per semester hour
C = 79 - 70:	2 points per semester hour
D = 69 - 60:	1 points per semester hour
59 and below = F	0 points per semester hour
IP (In Progress)	0 points per semester hour
W(Withdrawn)	0 points per semester hour
I (Incomplete)	0 points per semester hour
AUD (Audit)	0 points per semester hour

### Incomplete Policy:

IP (In Progress) is given only in certain developmental courses. The student must re-enroll to receive credit. COM (Completed) is given in non-credit and continuing education courses. To compute grade point average (GPA), divide the total grade points by the total number of semester hours attempted. The grades "IP," "COM" and "I" do not affect GPA.

**HCC Grading Scale can be found on this site under Academic Information:**  
**<http://www.hccs.edu/resources-for/current-students/student-handbook/>**

## Course Calendar

Date	Lecture	In Class Exercise	Assignment
Week 1 08/25/2021	Class Introduction & Introduction to Raster Data		
Week 2 09/01/2021	How to Use Raster Data in ArcGIS	Course Pack 1	Assignment 1 – How to use Raster Data
Week 3 09/08/2021	Spatial Interpolation	Course Pack 2	
Week 4 09/15/2021	Remote Sensing in GIS	Course Pack 3	
Week 5 09/22/2021	Composite Images	Project 1: Creating Multispectral Imagery of the Chesapeake Bay	Assignment 2 - Project 2: Multispectral Composite bands of the Las Vegas Area
Week 6 09/29/2021	Unsupervised Classification	Project 1: Calculating Unsupervised Classification of the Chesapeake Bay	Assignment 3 – Project 2: Calculating Unsupervised Classification of Las Vegas, Nevada
Week 7 10/06/2021	Supervised Classification	Project 1: Calculating Supervised Classification of the Chesapeake Bay	Assignment 4 - Project 2: Calculating Supervised Classification of Las Vegas, Nevada
Week 8 10/13/2021	<b>Midterm</b>		
Week 9 10/20/2021	LIDAR in ArcGIS Pro	Project 1: Baltimore, Maryland	Assignment 5 - Project 2: San Francisco
Week 10 10/27/2021	Location of Solar Panels	Project 1: James Madison University	Assignment 6 - Project 2: San Francisco University
Week 11 11/03/2021	Forest Vegetation Height	Project 1: George Washington National Forest, Virginia	Assignment 7 - Project 2: Michaux State Forest, Pennsylvania
Week 12 11/10/2021	Volumetric Analysis & Shadow Maps	Project 1 - Baltimore, Maryland	Project 9 - Project 2: San Francisco
Week 13 11/17/2021	Surging Seas	Project 1 - Baltimore, Maryland	Project 10 - Project 2: San Francisco
Week 14 11/24/2021	<b>No class – Thanksgiving Week</b>		
Week 15 12/01/2021	Shoreline change after Hurricane Sandy	Project 1: Deal, New Jersey	
Week 16 12/08/2021	<b>Final Exam</b>		

### 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.

# **Instructor's Practices and Procedures**

## **Academic Integrity**

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

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

## **Attendance Procedures**

The HCCS attendance policy is stated in the Schedule of Classes: "Students are expected to attend classes regularly. Students are responsible for materials covered during their absences, and it is the student's responsibility to consult with instructors for make-up assignments. Class attendance is checked daily by instructors. Although it is the responsibility of the student to drop a course for non-attendance, the instructor has full authority to drop a student for excessive absences. A student may be dropped from a course for excessive absences after the student has accumulated absences in excess of 12.5% of the hours of instruction (including lecture and laboratory time)."

## **Student Conduct**

We will respect each other and ideas. Students will adhere to the student code of conduct while in class

## **Instructor's Course-Specific Information (As Needed)**

I like to have an open minded and student-learning environment. In order to complete this I allow students to go through their own thought processes. At the beginning of every class well conduct open discussions on the reading materials and videos. By having an open sessions students and myself can learn from everyone in the class.

## **Electronic Devices**

During class time be respectful to me and your peers, Silence all devices.

## HCC Policies

Here's the link to the HCC Student Handbook <http://www.hccs.edu/resources-for/current-students/student-handbook/> 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

### EGLS<sup>3</sup>

The ECLS<sup>3</sup> (Evaluation for Greater Learning Student Survey System) 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. ECLS<sup>3</sup> surveys are only available for the Fall and Spring semesters. -ECLS3 surveys are not offered during the Summer semester due to logistical constraints.

<http://www.hccs.edu/resources-for/current-students/egls3-evaluate-your-professors/>

### Campus Carry Link

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

<http://www.hccs.edu/departments/police/campus-carry/>

### 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 and activate it now. You may also use Canvas Inbox to communicate.

## **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.

## Office of Institutional Equity

Use the link below to access the HCC Office of Institutional Equity, Inclusion, and Engagement (<http://www.hccs.edu/departments/institutional-equity/>)

### Disability 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 <http://www.hccs.edu/support-services/disability-services/>

### 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)  
<http://www.hccs.edu/departments/institutional-equity/title-ix-know-your-rights/>

### 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/>

### Department Chair Contact Information

Ramin Zamanian [Ramin.Zamanian@hccs.edu](mailto:Ramin.Zamanian@hccs.edu) 713-718-2869