# Geospatial Measurement and

# Environmental Monitoring

QUICK MENU

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| [Instructor](#2xcytpi) | [Objectives](#3dy6vkm) | [Prerequisites](#2s8eyo1) |
| [Materials/Texts](#3rdcrjn) | [Schedule](#lnxbz9) | [Assignment Outline](#35nkun2) |
| [Grading](#44sinio) | [Policies](#1y810tw) |  |

# Summary

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| **Course Title** | Geospatial Measurement and Environmental Modeling |
| **Course No.** | GEOG 16365 |
| **CRN** | 42444 |
| **Start/End Dates** | 9/01/2020-12/14/2020 |
| **Term/Module** | Fall 2020 |

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| **Delivery Method** | **Number of Face-to-Face Meetings** |
| Online |  |

## Course Description

This course introduces techniques of collecting information about the physical world for use in GIS or other spatial analysis. Perspectives and skills on the acquisition, evaluation, and use of location information will be introduced using conventional methods and advanced technologies, such as geographic positioning systems.

# Instructor

[Top Menu](#3whwml4)

|  |  |
| --- | --- |
| **Name** | Richard Ferrigno |
| **Email** | ferrigno@rowan.edu |
| **Phone** | 908-797-4719 |
| **Virtual  Office Hours** | Post questions and comments for the instructor to the Office Hours board (in **Discussions** Area). The instructor will respond within approximately 48 hours. For faster or more private correspondence, use email or phone. |

# Objectives

[Top Menu](#3whwml4)

Through active participation in this course and completion of all course activities and related assignments, students will gain familiarity and direct experience with the concepts, methods, and frameworks associated with the following geospatial modeling tasks and applications:

1. Conceive of abstracted models of spatial conditions
2. Plan and execute spatial modeling tasks
3. Critically examine criteria used in analyses
4. Evaluate results, error, and uncertainty in geospatial modeling applications
5. Communicate effectively about the requirements, criteria, methodology, results, and interpretations of geospatial models

# Prerequisites

[Top Menu](#3whwml4)

* GEOG 16160 Intro to Mapping and Geographic Information Sciences
* GEOG 16260 Fundamentals of Geographic Information Systems (GIS)

# Materials and Texts

[Top Menu](#3whwml4)

Under the Rowan Fair Use Practice Policy select chapters will be provided to students from the following textbooks:

* The Esri Guide to GIS Analysis, Volume 3 - Andy Mitchell
* The Esri Guide to GIS Analysis, Volume 2 - Andy Mitchell
* GIS and Cartographic Modeling - C. Dana Tomlin
* Mastering ArcGISPro -Maribeth Price
* GIS Fundamentals -A First Text on Geographic Information Systems 6th Edition - Paul Bolstad

# Schedule

[Top Menu](#3whwml4)

**The following schedule is tentative and may be changed with prior notification from the instructor.**

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| **Weeks** | **Start Date** | **Readings, Activities & Assignments** |
| **1** | 09/01/20 | **Topics: Course Introduction and Data Models**   * Week #1 - Course Overview * Week #1 - Geospatial Data Introduction   **Readings:**   * Tomlin - GIS and Cartographic Modeling Chapter 1   **Lectures:**   * Course Overview * Data models- Raster vs. Vector * The Cartographic Data Model   **Videos:**   * <https://www.youtube.com/watch?v=kH4Vgc5f8lY> * <https://www.youtube.com/watch?v=HwVFvHwuYJo> |
| **2,3** | 09/08/20  09/15/20 | **Topics: (Application of GIS Models- Modebuilder Module weeks 2-4)**   * Week #2 - GIS Models, Coordinate Systems * Week #3 - Introduction to Modelbuilder, Advanced Modelbuilder Topics   **Readings:**   * **Week #2 -** Maribeth Price - Coordinate systems   **Lectures:**   * Week #2 -Projections, units of measure, coordinate systems * Week#2 - GIS Modeling * Week#3 - Introduction to Modelbuilder * Week#3 - Advanced topics in Modelbuilder   **Videos:**   * <https://www.youtube.com/watch?v=5hl4FT7HXvs> * <https://www.youtube.com/watch?v=DoIkV2y0pEc>   **Assignments:**   * Lab #1 -Model Builder Lab - Assigned 9/15/20 - DUE: 9/28/20 |
| **4,5** | 09/22/20  09/29/20 | * Week#4 - Geoprocessing Tools   **Quizzes/Exams:**   * Quiz #1 (Modelbuilder Module weeks 1-4) -9/29/20   **Topics: (Introduction to Spatial Analysis - Spatial Interpolation, Patterns, and Environmental Data Collection Methods Module weeks 5-7)**   * Week#5 - Spatial Analysis * Week #5 - Patterns   **Readings:**   * Week #5 - Week #5 ESRI -”The Language of Spatial Analysis” pg 1-40 * Week #5 - The Esri Guide to GIS Analysis, Volume 2 - Andy Mitchell - Chapter 3 Identifying Patterns   **Lectures:**   * Week #5 **-**Introduction to Spatial Analysis * Week #5 - Understanding patterns and How to Measure Them   **Videos:**   * [**https://www.youtube.com/watch?v=\_nWedo7ohzM**](https://www.youtube.com/watch?v=_nWedo7ohzM) * <https://www.youtube.com/watch?v=vVmJH7Z0xuo> * <https://www.youtube.com/watch?v=6LbN9cBFVyg>   **Discussions:**   * Module Reflection Assignment #1 Assigned 9/22/20 Due - 9/28/20 |
| **6,7** | 10/06/20  10/13/20 | **Topics: (Spatial Interpolation, Patterns, and Environmental Data Collection Methods Module weeks 5-7)**   * Week #6 - Spatial Interpolation * Week #7 -Terrain Analysis   **Readings:**   * Week #6 - Chapter 4 Mapping Density - Mitchell * Week #7 - Chapter 11 Terrain Analysis - Bolstad   **Lectures:**   * Week #6 - Mapping Density * Week #6 - Spatial Interpolation and Associated Tools * Week #7 - Terrain Analysis   **Videos:**  **Discussions:**   * Module Reflection Assignment #2 Assigned - 10/13/20 Due - 10/19/20   **Assignments:**   * Lab #2 Rowan Fossil Park Surface Lab 10/6/20 - DUE 10/19/20 |
| **8,9** | 10/20/20  10/27/20 | **Topics: (Suitability Modeling and Module weeks 8-10)**   * Week #8 - GIS Modeling Process * Week #8 - Raster Data * Week #9 - Designing a Boolean Suitability Model * Week #9 - Weighted Overlay Model   **Readings:**   * Week #8 - Maribeth Price – Mastering ArcGIS Pro – Chapter 11 – “Raster Analysis” * Week #9 - Mitchell - Designing a Boolean Suitability Models * Week #9 - Mitchell Weighted Overlay   **Lectures:**   * Week #8 - GIS Modeling Process * Week #8 - Raster Modeling - Map Algebra * Week #9 - Boolean Overlay Models * Week #9 - Weighted Overlay Model   **Videos:**   * <https://www.youtube.com/watch?v=-W7HumdLzW4>   **Quizzes/Exams:**   * Week #8 - Quiz #2 (Spatial Interpolation, Patterns, and Environmental Data Collection Methods weeks 5-7) - 10/20/20   **Assignments:**   * Lab # 3 Suitability Analysis Lab -Assigned 10/27/20 - DUE: 11/09/20 |
| **10,11** | 11/03/20  11/10/20 | **Topics: (Suitability Modeling Module week 10)**   * Week 10 -Fuzzy Overlay Models   **Lectures**   * Week #10 - Rating locations using fuzzy overlay   **Readings:**   * Week #10 - Mitchell Fuzzy Overlay Modeling   **Discussions:** Module ReflectionAssignment #3 - Assigned 11/3/20 - DUE: 11/9/20  **Topics: (Spatial Statistics and Modeling Module week 11)**   * Week #11 -Introduction to Spatial Statistics   **Readings:**   * Week #11 - ESRI “An Overview of the Spatial Statistics Tool Box” - [Link](https://pro.arcgis.com/en/pro-app/tool-reference/spatial-statistics/an-overview-of-the-spatial-statistics-toolbox.htm) |
| **12,13** | 11/17/20  11/24/20 | **Topics: (Spatial Statistics and Modeling Module weeks 12)**   * Week #12 -Regression Analysis   **Readings:**   * Week #12 - “Regression analysis basics” web article by ESRI ([Link](https://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-statistics-toolbox/regression-analysis-basics.htm))   **Lectures:**   * Week#12 - Regression analysis   **Quizzes/Exams:**   * Week #12- Quiz #3 (Site Suitability weeks 8-10) - 11/17/20   **Assignments:**   * Lab #4 - Philadelphia Crime Regression- Assigned 11/17/20 DUE: 11/30/20   **Topics: (Course wrap up module weeks 13-14)**   * Week #13 - Data integrity and Uncertainty   **Readings:**   * Week #13 - Brimicombe Chapter 8 pg. 213-226   **Lectures:**   * Week #13 - Data integrity and Uncertainty   **Videos:**   * <https://www.youtube.com/watch?v=-7R2NEB8mnc> * <https://www.youtube.com/watch?v=kZRcP7NrobU> * <https://www.youtube.com/watch?v=-mhjdsPzfwc>   **Discussions:**   * Module Reflection Assignment #4 - Assigned 11/24/20 DUE:11/30/20 |
| **14,15** | 12/01/20  12/08/20 | **Topics: (Other types of models module week 14)**  **Topics: Week 15 Final Exam**   * Week #14 -Resume Development and Landing a Job * Week #15 - Final Exam   **Lectures:**   * Week #14 - Resume Development   **Videos:**   * <https://www.youtube.com/watch?v=YqjfdobHBFA>   **Discussions:**  **Quizzes/Exams:**   * Week #14- Quiz #4 Spatial Statistics Module weeks 11-13) - 12/2/20 * Week #15 - Final Exam |

# Assignment Outline

**Module Reflection/Discussions -** Throughout the course students will be required to complete reflection/discussion questions at the conclusion of each three week module. These questions will work to ensure students are learning and retaining the relevant course material and key objectives of each module. At the conclusion of each module, two to three discussion questions will be posted on Canvas. Students will be required to submit short answer replies for each set of discussion questions via Canvas by the start of the following week's class.

**GIS Labs -** Throughout the semester students will complete a total of four GIS labs that incorporate the course content. Each lab will serve as a practical hands-on application of the GIS concepts taught in the module or a series of modules. Labs will be completed by students on their personal computers or in the Rowan GIS lab. Labs will generally have longer periods for completion and will overlap with classroom sessions where the professor can assist students as necessary.

**Quiz and Exam Policy**

**Quizzes -** Throughout the semester there will be a total of four quizzes. Each quiz will be taken by students during the in person classes via Canvas. Quizzes will generally be given after the completion of two course modules or approximately every 4 weeks.

**Final Exam -** At the conclusion of the course on the 15th week students will come into the last in person class to complete the final exam which will be administered in class via Canvas.

**IMPORTANT REMINDER:** Each student is expected to work on this **individually** and within the confines of the University Academic Honesty Policy (see <http://www.rowanonline.com> for University Policies and details).

[Top Menu](#3whwml4)

# Grading

**Late work policy**

All assignments are expected to be turned on or before the due dates outlined in the syllabus. If work is submitted late it will be subject to the following late work policy.

Assignment submitted less than 1 week late = -10%

Assignment submitted 1 week late but less than 2 weeks late = -50%

Assignments submitted over 2 weeks late will not be accepted (No Credit)

[Top Menu](#3whwml4)

## Final Grade Breakdown

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| **Grading Criteria/Assignment** | **Points/Percentage** |
| GIS Lab#1 - Model Builder | 100 |
| GIS Lab#2 | 100 |
| GIS Lab#3 | 100 |
| GIS Lab#4 | 100 |
| Module Reflection Assignments (x4 40 Pts Each) | 160 |
| Quizzes (x4 50 Pts Each) | 200 |
| Final Exam | 200 |
| Attendance (In Person Classes) | 40 |
| **Total** | **1000** |

## Grading Scale

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| --- | --- | --- | --- |
| **A** | 93 and Up | **C** | 74 – 76 |
| **A-** | 90 – 92 | **C-** | 70 – 73 |
| **B+** | 87 – 89 | **D+** | 67 – 69 |
| **B** | 84 – 86 | **D** | 64 – 66 |
| **B-** | 80 – 83 | **D-** | 60 – 63 |
| **C+** | 77 - 79 | **F** | 59 and Below |

# Rowan Online Standard Policies (addendum)

The current version of Rowan Online Standard Policies, which are an addendum to this syllabus, are found in the [Rowan Online Standard Policies](https://docs.google.com/document/d/1o5XB4J2W8h52egi5-CnrpupqDMeN9LyFXRM8xiUj8Lk/edit#heading=h.ovkmxcofmaz1).

[Top Menu](#3whwml4)