SKUAST-K

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URGENT

Geomatics
NRM 3212

Spring 2022

Course Teacher(s)

Dr. Akhlaq Amin Wani
Dr. Aasif Ali Gatoo
Dr. Shah Murtaza Mushtaq

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Content

1. General Information

Course code	:	NRM 3212
Course Title	:	Geomatics
Number of credits	:	4
Course duration	:	18 weeks
Level	:	Undergraduate
Course Teacher	:	Dr. Akhlaq Amin Wani Dr. Aasif Ali Gatoo Dr. Shah Murtaza Mushtaq
Pre-requisite	:	Prior knowledge of handling computers and basic knowledge in Forestry.

2. Course description

The course prepares students for careers as leaders in understanding Remote Sensing (RS) and Geographical Information System (GIS) and Applications of RS and GIS in monitoring and managing forest resources.

3. Course objectives

The main course objective is to make students understand the basics of remote sensing and Geographical Information System and Global Positioning System (GPS). It is further aimed at developing among students the skills to use remote sensing and GIS based software. The course is outlined and offered in hybrid mode to enable students learn and pick up at their own pace and have the flexibility in their schedule.

4. Course outcome

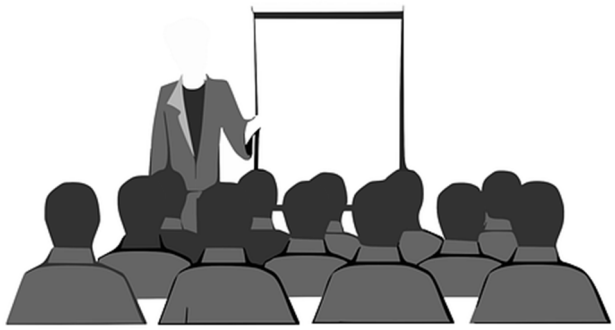
On completion of this course, the students would:
Gain a wider understanding of basic principles of remote sensing and GIS
It will enable the students to explore and handle different satellite datasets for specific applications in forests and vegetation landscapes.
The students will enhance abilities and skills for mapping and monitoring of changes associated with forest and urban green spaces for effective policy making and management.

5. Course structure

	UNIT 1
Week1	Remote sensing - classification based on source: Active and passive remote sensing
	Aerial and space remote sensing; Interaction of electromagnetic radiation with atmosphere and earth surface
Week2	Aerial photographs – types; Photo interpretation
	Practical: Preparation maps; Visual interpretation of satellite imagery; Forest cover mapping and land use mapping.
Week3	Satellite remote sensing - platforms and sensors
	Satellite systems. Indian Remote Sensing Programme
Week4	Visual and digital image processing;
Week5	**Practical:** Digital image processing. Introduction to various GIS software – Q-GIS, ERDAS, Arc GIS etc.
	Mid Term Exam
	UNIT 2
Week6	Application of satellite based remote sensing techniques in forestry
	vegetation mapping using satellite imagery-NDVI
Week7	Practical: Hand on exercises on Vegetation Indices, Vegetation Index (VI), Normalized Differential Vegetation Index (NDVI), Soil Adjusted Vegetation Index (SAVI) etc
Week8	Forest cover monitoring and damage assessment
	Microwave remote sensing
	UNIT 3
Week9	Introduction to GIS.
	Differences between GIS and conventional cartography
Week10	Spatial and non-spatial data- Integration of attribute data with spatial data
	Spatial data - Raster and Vector data-Thematic over lays in GIS
Week11	Topology building and calculation of area and length etc
Week12	**Practical:** Exercises in viewing, editing, overlay.

	UNIT 4
Week13	Application of GIS in forestry – using imageries and integration with GIS data
	Maps-its projection
Week14	Toposheet and Map reading.
	Visit to the GIS labs at State level.
Week15	**UNIT 5**
	Global Positioning System (GPS)
Week16	Applications in resource inventory
	Global Navigation Satellite System
Week17	Galileo, GLONASS, QZSS, Compass, IRNSS etc., GAGAN
	Practical: GPS handling
Week18	**Practical Exam/Assignment submission/Presentation**
	End Tem Exam

5. Course structure



In Class Lectures

Students will be able to

1) Understand the basic concepts of remote sensing, GIS and GPS.
2) Explain how this technology can be applied in forestry and green space management.

Lab Exercises

Students will be able to

1) Handle satellite data using different remote sensing and GIS software.
2) Learn different image processing techniques and its application.

Google Classroom

On line Tutorials

Google Class Code: p4oikrn

Students will explore and learn more about

1) Basic concepts of remote sensing, GIS and GPS and its applications through lectures notes and video lectures.

Assignments/Presentation

Students at individual level and in groups will explore and learn more about

1) Satellite data handling, Satellite data interpretation.
2) Land use land cover mapping and basics of modeling of geoinformatics.
3) Prepare and process geographical data and use in class activities.
4) Presentation.

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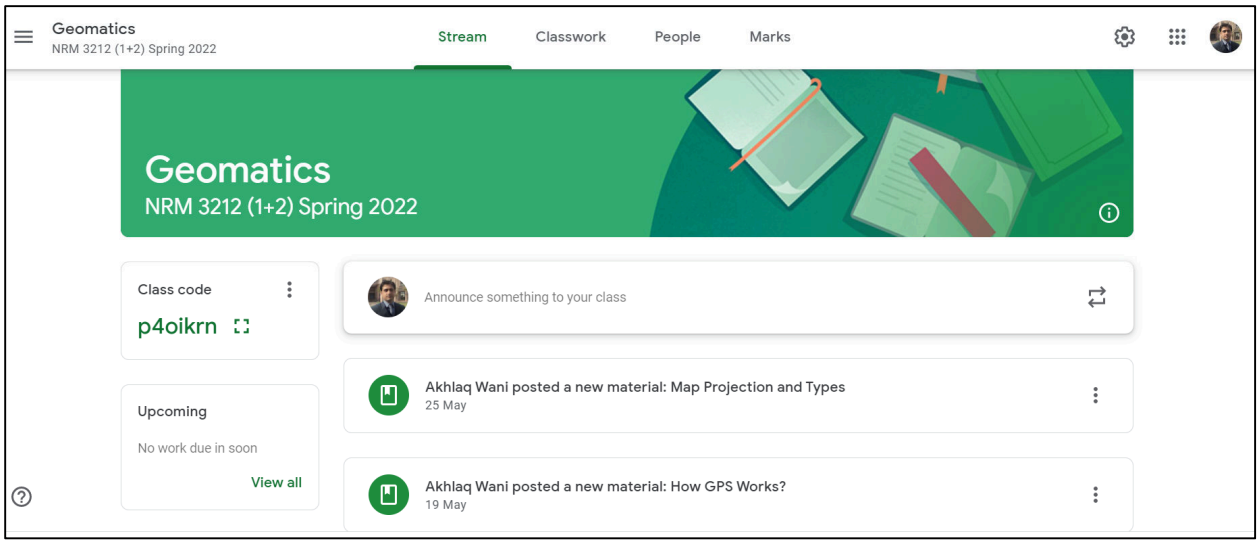
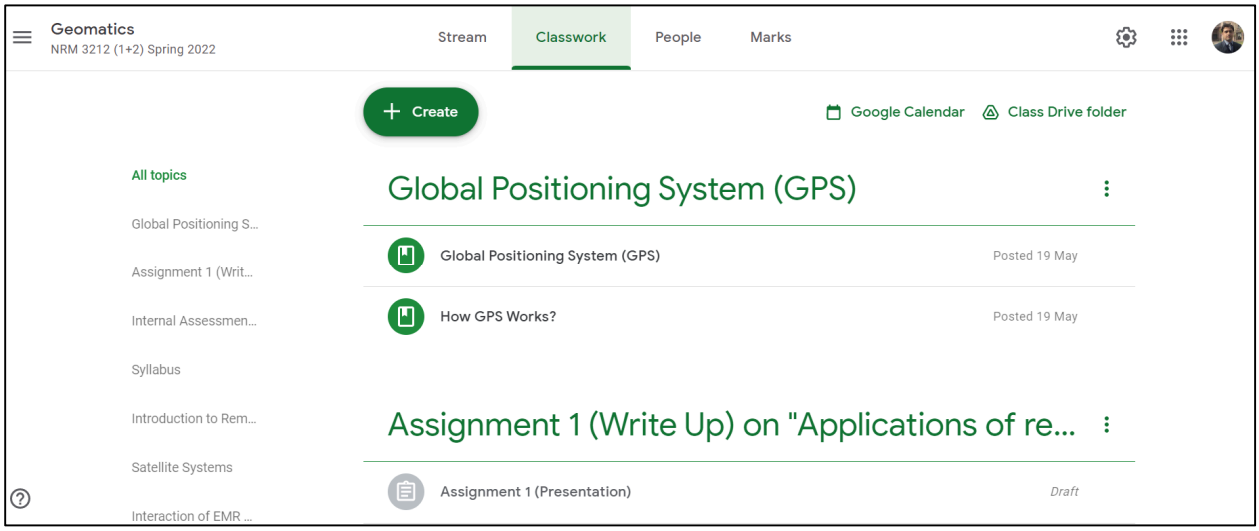
Online Tutorial





Video Lectures and Links

Introduction to Remote Sensing Part-1
https://www.youtube.com/watch?v=TEPdVkWAABc&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=1&t=6s

Introduction to Remote Sensing Part-2
https://www.youtube.com/watch?v=-inU7S2n5sg&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=2&t=277s

Introduction to Remote Sensing Part-3
https://www.youtube.com/watch?v=QamG5FhnmgY&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=3&t=125s

Satellite Systems
https://www.youtube.com/watch?v=avLN5Xjproo&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=4

Digital Image Processing Part-1
https://www.youtube.com/watch?v=j0eqEZ4gpG0&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=2

Digital Image Processing Part-2
https://www.youtube.com/watch?v=5FdNXsyUP0s&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=3

Interaction of EMR with atmosphere
https://www.youtube.com/watch?v=IspXDE2by_Q&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=7&t=120s

Digital Image Resolution

https://www.youtube.com/watch?v=n3nwbNh1OYM&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=8

Types of Resolution

https://www.youtube.com/watch?v=1UxtQNSt970&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=9

Introduction to Photogrpammetry

https://www.youtube.com/watch?v=PTnL7ZI7yJs&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=9&t=68s

False Color Composite & True Color Composite

https://www.youtube.com/watch?v=bcMZHwH9pCU&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=5

Multiband Operations

https://www.youtube.com/watch?v=42QvKNRx2cY&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=7

Introduction to GIS

https://www.youtube.com/watch?v=1lT9NnYsL-Q&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=13

GIS models and data representation

https://www.youtube.com/watch?v=E0HQAnoY2Eg&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=14

Introduction to GIS database management system

https://www.youtube.com/watch?v=vO_J7jVhoVc&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=15&t=21s

Aerial Photography

https://www.youtube.com/watch?v=4eelhdVFTQo&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=8

Introduction to Photogrpammetry

https://www.youtube.com/watch?v=PTnL7ZI7yJs&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=9&t=68s

Scale, Focal Length and Height

https://www.youtube.com/watch?v=f1-kzkcpf9U&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=10&t=19s

Relief Displacement Formula

https://www.youtube.com/watch?v=HDg6oZuq52Y&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=11&t=17s

Database Management System (DBMS)

https://www.youtube.com/watch?v=6yEkm_UI7PA&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=12

Topology, Thematic and Raster Overlay

https://www.youtube.com/watch?v=WhAQpkAV8tM&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=13

Visual Image Interpretation

https://www.youtube.com/watch?v=dclDduYUMI8&list=PLgQLxnNI9f_C8QXAlhXprtN47eBYT3lq6&index=22

Map Projection and Types

https://www.youtube.com/watch?v=tlDiHeHsLns&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=14

Microwave Remote Sensing

https://www.youtube.com/watch?v=dCt1BYLlm5k&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=15&t=101s

Raster data storage and compression
https://www.youtube.com/watch?v=2XvrOQmNnaI&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=16&t=10s

Global Positioning System
https://www.youtube.com/watch?v=_m0FZcZGKdk&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=18&t=30s

How GPS works?
https://www.youtube.com/watch?v=9ees6hLatrE&list=PLgQLxnNI9f_D7c1JYC8OiF3rFxkoEhj2m&index=17&t=515s

6. Course Assessment

Mode of assessment	% of marks
Mid Term (Objective and Written)	30
Practical/Assignments (Discussion)	20
End Term (Objective and Written)	50
Total	**100**

7. References

Compulsory

Joseph, G. (2005). Fundamentals of Remote Sensing-Second edition. Universities Press

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Lillesand, T.M. and Kiefer, W.R.(1994).Remote sensing and Image Interpretation, Fourth edition. John Wiley & Sons, Inc., USA

Environment System Research Institute, (1999). GIS for Everyone. Redlands, CA:ESRI

Recommended

Campbell, J.B. (2002). Introduction to Remote Sensing-Third edition. Taylor and Francis, London

Jackson, M.J. (1992). Integrated Geographical Information Systems. International Journal of Remote Sensing, 13(6-7): 1343-1351

Obi Reddy, G.P. and Sarkar, D. (2012). RS and GIS in Digital Terrain Analysis and Soil Landscape Modelling. NBSS & LUP, Nagpur.