## GIS Education and Research at Kathmandu University

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## PART 1

## **Issues and challenges**

### **Issues and Challenges of GIS Implementations**

- Infrastructure development and use
- Providing quality education
- Delivery of course
- Enhancing private/ private and private/ public understanding and support at both national and international level for running the program
- Expansion of further higher education and job market
- Sustainability of the program



### PART 2 Introduction



### Introduction: Department of Geomatics Engineering

- Established on March 26, 2019
- Youngest Department of School of Engineering

Programs

- Diploma in Geomatics Engineering (Started in 2015): KU-LMTC-CTEVT
- Bachelor in Geomatics Engineering (Started in 2007): KU-LMTC
- Master in Land Administration (Started in 2013): KU-LMTC
- ME/MS in Geoinformatics (Started in 2019): KU-LMTC
- PhD



### **Overcoming the Problems**



All programs are running in collaboration with LMTC under the framework of MoU

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Reshma Shrestha

Brijesh

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Dr. Subash Ghimire, Head of De...

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AGSE International conference 2021 in collaboration with Stutgart University of Applied Sciences

🔏 Brijesh

### **International Collaboration**

Countries	University/Institution	Remarks				
The Netherlands	University of twente., ITC	Master in Land Administration and MSC in Geoinformatics				
Turkey	Yildz Technical University	Geomatics Engineering				
Australia	University of Melbourne/Tasmania	Geomatics Engineering				
	University of Southern Queensland	Geomatics Engineering				
Austria	University of Salzburg	MSC in Geoinformatics				
USA	UNAVCO, Inc., a Colorado Nonprofit Corporation					
China	Changan University	MSC in Land Administration				
Israel	Hebrew University	Spectral Imaging and UAV (planning)				
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### Vision

To become center of excellence by providing quality education and research for leadership in Surveying, Mapping, Land Management and Geoinformation sector in collaboration with Government and other national and international organizations

### Short term

- To strengthen all Geomatics Engineering Program with quality output.
- To start research oriented MS program
- To strengthen PhD program

### Long term

- To promote research and development in Surveying and Mapping, Land Management and geoinformation
- To provide the consultant services in Surveying and Mapping, Land Management and geo information.
- To Promote a Department as spatial knowledge/data hub

	Year	Semester	Course Outlines: BE in Geomatics Engineering								Total Credit
	Ι	I	MATH 101 Calculus and Linear Algebra [3]	PHYS 101 General Physics I [3]	CHEM 101 General Chemistry [3]	ENGT 101 Communication Skills English I [2]	COMP 103 Structure Programming Language [2]	Elements of Engineering I ENGG111 [3]	ENGG 101 Engineering Project I [2]	ERDG101 Engineering Drawing I [2]	20
		П	MATH 104 Advance Calculus [3]	PHYS102 General Physics II [3]	ENVE102 Introduction to Environmental Engineering [2]	ENGT 102 Communication Skills English II [2]	COMP 116 Object Oriented Programming [3]	ENGG112 Elements of Engineering II [3]	ENGG 102 Engineering Project II [2]	EDRG102 Engineering Drawing II [2]	20
	Ш	I	MATH 207 Differential Equation & Complex variables [4]	MATH 205 Trigonometry and Analytical Geometry [3]	GEOM 201 Introduction to Surveying and Geomatics [2]	GEOM 202 Control Surveying [4]	GEOM 208 Engineering Project III [2]	GEOM 205 Topographical Surveying [3]			18
		П	MATH 208 Statistics & Probability [3]	COMP 204 Data Communication & Computer Network [3]	MCSC 202 Numerical Methods [3]	GEOM 206 Cartography [3]	GEOM 204 Geographical Information Systems [3]	CEEG 201 Basic Civil Engineering [3]	GEOM 203 Field Surveys I [4]		22
	ш	Ι	MGTS 301 Engineering Economics [3]	GEOM 318 Spatial Data Base Management [3]	GEOM 316 Photogrametry [4]	GEOM 317 Physical Geodesy [3]	Engineering and Construction Survey [3]	Engineering Project IV [2]			18
	m	П	GEOM 306 Land Administration [3]	GEOM 307 Theory of Errors and Adjustment [2]	GEOM 313 Modern Cartography [2]	GEOM 319 Computational Geomatics [3]	GEOM 310 Cadastre [3]	GEOM 315 Satellite Geodesy [3]	GEOM 304 Field Surveys II [4]		20
	IV	I	GEOM 401 Survey Project Management [3]	GEOM 402 Remote Sensing [3]	CIEG 405 Entrepreneurship and Ethics [3]	GEOM 4** Elective I [3]	GEOM 405 Web GIS [3]	GEOM 406 Spatial Data Infrastructure [2]	GEOM 4** Elective II [3]		20
	Note: The fi	II ourse in the square breeks	t indicate the course or all	1	GEOM 410 Final Independent Project [6]	GEOM 412 Internship [3]	GEOM 404 Field Surveys III [4]		0	6	13

## PhD Research Topic

 Monitoring rice cropland and yield estimation using multisensor, multi-templar datasets and citizen science approach

 Responsible Land Governance for Food Security: Analyzing from Land use planning perspective

 Geoid Determination of Nepal from Surface and Airborne Gravity



## PART 3 Research Projects



## **Research projects**

- 1. Strengthening Geospatial Infrastructure and Research Capacity at Kathmandu University funded by **NASA through ICIMOD** (completed)
- 2. Developing Demonstration Model to Revive Springs for Enhancing Rural Water Security (completed)
- 3. Land Surface temperature change analysis of Kathmandu Valley using Landsat images funded by **UGC** (completed)
- 4. Developing Land Valuation model for land acquisition in infrastructure development- A livelihood perspective funded by **NAST** (completed)
- 5. Estimation of Above Ground Forest Biomass and Carbon Stock Using UAV Images funded by **NASA through ICIMOD** (completed)
- 6. Maize Biomass Estimation Using Images from Unmanned Platform using Consumer Grade RGB Camera funded by **UGC and The International Maize and Wheat Improvement Center (CIMMYT)** (completed)
- 7. Inspection of transmission line infrastructure for Bhaktapur-Baneshwor-Patan-66 kV Transmission Line Upgradation **Project funded by NEA Engineering Company** (completed)
- 8. Survey and mapping of Jagdulla Hydro-Electric Project funded by **NEA Engineering Company** (completed)

### **Geomatics in Damage Assessment**

- Collected the aerial images of these places with the Sony Digital Camera (Sony Cybershot W120) mounted on the UAV.
- The images were taken at the height of about 100m from the ground.
- The image overlap were 80% in the flight direction and 60% across the flight direction.
- The UAV has its inbuilt GPS and IMU so the location of camera position was recorded for each image along the flight.



### **Research projects**



Kathmandu Valley mapping project during COVID 19 in collaboration with KU, ICIMOD and Private sectors

### **Community development planning maps** (Digital Elevation Mapping for Development - DEM4D)



Kalinchowk RM, Ward No. 1, Dolakha

# **Community development planning maps** as outputs (Digital Elevation Mapping for Development - DEM4D)



Kalinchowk RM, Ward No. 1, Dolakha



## PART 4 Labs at the Department









### Survey Lab

### HPC at KU

### **CORS** station



### **Geospatial Lab**





### Photogrammetry Lab

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# PART 5 Internship and Student's Project





Symbol

 $\boxtimes$ 

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Road Wall

#### **Profile of Dhulikhel Road** 1478 Map of Dhulikhel Road 1477 1476 1475 Elevation(m) 1474 1473 1472 F Postu Karysla 1471 Â Αĭ AV AV ⑪ -Por No <u>A</u> $\sim$ 1470 District 1469 1468 0+000 0+100 0+200 0+300 0+400 0+500 0+600 0+700 0+800 Chainage(m) Legend Particulars Temporary Building Permanent Building Scale: - 1:1000 Electric Pole Ν Gate

### **Student's Project**





**COVID-19 Outbreak in Nepal** 

Arsenic Concentration Map of some VDCs of Sunsari District

### Student's Project



Mapping of Locations of ATM station in Kathmandu valley



### Web enabled land information system

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### Student' s project





Earthquake hazard map

#### Flood inundation map

Landslide hazard susceptibility map

### MoU Between KU and Supermap Software Co. Ltd

Super Map





SuperMap International Email: jorin a supermap com



Assistant Professor and Acting Head. Department of Geometrics Engineering, School of Engineering, Kathmandu University. Dhulikhel, Kayre, Nepal Email: subash\_glinnire u ku edu np

Signed for and on behalf of

Super Map

SuperMap Software Co. Ltd



SuperMap Asia & Oceania Center Date: 03/09/2021

School of Engineering, Kathmandu University



School of Engineering, Kathmandu University. Dhulikhel, Kayre, Nepal. Email: dean enega kueduop Date: 03/09/2021

Dean.

Memorandum of Understanding Between SuperMap Software Co. Ltd

And

School of Engineering, Kathmandu University, Dhulikhel, Nepal.



• GIS/Geomatics is a career without boundaries.

- It is essential to promote the need of GIS/Geomatics education and draw attention of all national and international Geo information community for their contributions and collaborations.
- The strategies should be designed to leap and come up with the pace of developed countries, not always fall behind but to walk hand in hand.



The Fourth International Workshop on GIS Technology and Application

# THANK YOU.