OBAFEMI AWOLOWO UNIVERSITY
ILE-IFE, NIGERIA

REVISED CURRICULUM FOR THE UNDERGRADUATE PROGRAMME B.Sc. DEGREE PROGRAMME IN SURVEYING AND GEOINFORMATICS

BY

DEPARTMENT OF SURVEYING AND GEOINFORMATICS
FACULTY OF ENVIRONMENTAL DESIGN AND MANAGEMENT
OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE.

Revised Curriculum for the Undergraduate Programme
(B.Sc. Surveying and Geoinformatics)
Department of Surveying and Geoinformatics
Faculty of Environmental Design and Management
Obafemi Awolowo University, Ile-Ife.

1.0 PHILOSOPHY AND OBJECTIVES OF THE PROGRAMME

Surveying and Geoinformatics is a professional programme registrable by Surveyors Council of Nigeria (SURCON) and a multi-disciplinary subject that serves as ally to disciplines in engineering (particularly civil engineering), environmental studies, analysis and planning. Surveying is the science that provides the spatial location of the earth's features and other environmental information, necessary for map production, designing engineering works, planning, location and exploitation of natural resources, as well as land administration. Geoinformatics is an integrated process for map and Geoinformation production through the supporting technologies of Global Navigation Satellite System (GNSS), photogrammetry, remote sensing, cartography, geospatial information system and computer science. The programme is designed with a new vision and bias for the digital aspects of the profession. It also ensures adequate related knowledge of mathematics, physics, environmental sciences, law, finance and management studies needed by Surveyors.

Being one of the programmes classified under Environmental Studies by the National Universities Commission (NUC), the general aim of the programme is to produce competent graduates with sufficient contemporary theoretical knowledge and practical skills to deal with planning, design, construction, management and conservation of man-made and natural environment. Specifically, the programme aims at training students to acquire skill and technical know-how in the collection, analysis, storage, distribution, management and application of spatially referenced data. Students would therefore be given comprehensive training in Surveying and Geoinformatics which includes inter alia, traditional areas of surveying, photogrammetry, cartography and hydrography, as well as the comparatively new fields of Global Navigation Satellite System (GNSS) Positioning, remote sensing and other spatial information systems.

Objectives

Upon completion of the course, students should be able to:

i. provide spatial and other environmental information necessary for designing and planning of engineering works, as well as in the location, exploitation and administration of natural resources;
ii. contribute to the design and implementation of geospatial information production systems.
iii. manage geospatial information production systems to communicate with users
iv. plan, direct and control production systems;
v. cost and price products and services
vi. prepare report on results.

2.0 JUSTIFICATION FOR THE PROGRAMME

The University Senate approved the B.Sc. degree programme in Surveying and Geoinformatics at its 305th meeting held on 28th November, 2012. The Nigerian Universities Commission (NUC) conducted a Resource Assessment in September 2014 and approved commencement of the programme from the 2015-2016 academic session; the program got a full accreditation of the NUC in 2020. The Surveyors Council of Nigeria (SURCON), the professional regulatory body for Surveying and Geoinformatics also conducted a professional inspection exercise in April 2017 and gave the approval to run the programme in the interim for two years (2017 – 2019). SURCON consequently conducted the full accreditation exercise in December, 2023.

To further strengthen the programme, the University signed a MoU with the African Regional Institute for Geospatial Information Science and Technology (AFRIGIST) and has continued to leverage on the opportunities provided by existing supporting facilities and human resources at the UNECA-sponsored Regional Centre for Training in Aerospace Surveys (RECTAS) for photogrammetry, GIS, digital mapping and remote sensing. There are also supporting facilities in the Department of Geography, Faculty of Environmental Design and Management as well as in the UNOOSA-affiliated African Regional Centre for Space Science and Technology Education - English (ARCSSTE-E).

Consequently, the B.Sc. programme that commenced in the 2015/2016 academic session with the admission of eighteen (18) 100-Level and eleven (11) 200-Level students has successfully graduated since 2018/2019 session till date.

3.0 ADMISSION REQUIREMENTS

There are three modes of entry into the programme subject to the candidate satisfying the University's minimum entry requirements.

3.1 Admission to Part I

Holders of Senior Secondary School Certificate (SSSC) or its equivalent, in addition to acceptable scores in UTME, candidates must have obtained five Senior Secondary Certificate (SSC) credit passes which must include Mathematics, Physics, English Language and any two of the following subjects: Geography; Technical drawing; Fine Arts; Chemistry; Biology; Economics; Agricultural Science and Elementary Surveying may be admitted into the programme.

3.2 Admission to Direct Entry

Candidates who satisfy the requirements specified below may be admitted into a four year programme, in which case they start from the second year of the five-year standard programme. Candidates admitted by direct entry may be required, where applicable, to take specified courses to make up for the deficiencies found in their academic background.
The requirements include:

i. Candidates who satisfy the UTME requirements and have G.C.E. (A/Level) or its equivalents with passes in Mathematics, Physics and any one of the following subjects: Geography, Technical

drawing, Fine Arts, Chemistry, Biology, Economics, Agricultural Science.

ii. Holders of National Diploma in Surveying and Geoinformatics or other related discipline like Civil Engineering, Building and Agricultural Engineering with a minimum of upper credit from the recognized programme may be admitted into 200 level.

iii. Candidates who satisfy the ND requirements and in addition hold Higher National Diploma in Surveying Geoinformatics with a minimum of Upper credit from the recognized accredited programme and have successfully completed mandatory National Youth Corps Service (NYSC) scheme may be admitted into 300 level of the programme.

4.0 Requirements for the Award of Degree

i. A UTME candidate must successfully complete the following categories of courses:

a) General Studies (CCMAS 70%)	08 units
b) Entrepreneurship Courses (CCMAS 70%)	04 units
Total	**12 units**

ii. Departmental Compulsory Courses:

CCMAS 70%	84 Units
OAU 30%	70 Units
Total	**168 Units**

iii. A Direct Entry candidate admitted into 200 level must successfully complete the following categories of courses:

a) General Studies (CCMAS 70%)	08 units
b) Entrepreneurship Courses (CCMAS 70%)	04 units
Total	**12 units**

Departmental Compulsory Courses:

CCMAS 70%	72 Units
OAU 30%	64 Units
Total	**148 Unit**

iii. A Direct Entry candidate admitted into 300 level must successfully complete the following categories of courses:

a)	General Studies (CCMAS 70%)	02 units
b)	Entrepreneurship Courses (CCMAS 70%)	02 units
Total		**04 units**

Departmental Compulsory Courses:

CCMAS 70%	52 Units
OAU 30%	44 Units
Total	**100 Units**

5.0 Duration of the programme

Students admitted through Senior Secondary School Certificate (SSSC) are expected to spend minimum period of five years (ten semesters) to go through the programme while students admitted through ND and Advanced A levels or equivalents into 200 level shall spend a minimum of four years (eight semesters) while students admitted through HND into 300 level shall spend a minimum of three years (Six semester)

A PROPOSED 30% ADDITIONAL COURSES TO CCMAS

100 Level

Course Code	Course Title	Units	Status
OAU_SVG 103	Introduction to Photogrammetry	3	C
OAU_SVG 105	Practical Surveying	2	C
OAU_SVG 107	Practical Photogrammetry	1	C
OAU_SVG 102	Introduction to Remote Sensing	3	C
OAU_SVG 104	Introduction to Cartography	3	C
OAU_ARC 103	Graphics Communication 1	2	C
OAU_ARC 104	Graphics Communication II	2	C
OAU_URP 104	Basic Elements of Planning	2	C
	Total	**18**	

200 Level

Course Code	Course Title	Units	Status
OAU_CSC 201	Computer Programming I	3	C
OAU_SVG 210	Fundamentals of Cartography	3	C
OAU_SVG 211	Practical Geoinformatics I	2	C
OAU_SVG 212	Practical Geoinformatics II	2	C
	Total	**10**	

300 Level

Course Code	Course Title	Units	Status
OAU_CSC 305	Introduction to Database Systems	3	C
OAU_SVG 312	Digital Mapping and Spatial data Management	2	C
OAU_SVG 314	Potential Theory and Spherical Harmonics	2	C
OAU_SVG 311	Practical Geoinformatics III	2	C
OAU_SVG 313	Spatial Data structure	2	C
OAU_SVG 318	Spatial Data Acquisition Techniques	2	C
OAU_SVG 316	Practical Geoinformatics IV	2	C
	Total	**15**	

400 Level

Course Code	Course Title	Units	Status
OAU_SVG 408	Geospatial Seminar	2	C
OAU_SVG 407	Safety and Swimming in Surveying	1	C
OAU_URP 407	Planning Law and Administration	3	C
OAU-SVG 200	SWEP	3	C
OAU-SVG 300	SIWES I	6	C
	Total	**15**	

500 Level

Course Code	Course Title	Units	Status
OAU_SVG 517	Survey Laws and Regulations	2	C
OAU_SVG 519	Applied Machine Learning	2	C
OAU_SVG 513	Geospatial Planning and Data Analytics	2	C
OAU_SVG 515	Principles and Applications of Geospatial Surface Modeling	2	C
OAU_SVG 509	Marine Surveying	2	C
OAU_SVG 518	Professional Practice and Ethics	2	C
OAU_SVG 516	Cadastre and Land Information Management	2	C
	Total	**14**	

B. OUTLINE OF PROGRAMME FOR PARTS I – V (CCMAS + 30%)

Level	Semester	CCMAS (Units)	OAU(Units)	Total (Units)
100	Harmattan	9	8	17
	Rain	7	10	17
200	Harmattan	12	5	17
	Rain	12	5	17
300	Harmattan	12	7	19
	Rain	10	8	18

400	Harmattan	10	6	16
	Rain	6	9	15
500	Harmattan	6	10	16
	Rain	12	4	16
Total		**96**	**72**	**168**

C. SUMMARY OF CCMAS (70%) & OAU SURVEYING AND GEOINFORMATICS (30%)

100 Level Harmattan

100 Level	**Course Code**	**Course Title**	**Units**	**Status**	**LH**	**PH**
CCMAS	GST 111	Communication in English	2	C	15	45
	PHY 101	General Physics I	2	C	30	-
	PHY 107	General Physics Practical I	1	C	-	45
	MTH 101	Elementary Mathematics I	3	C	45	-
	SVG 101	Introduction to Surveying and Geo informatics	1	C	15	-
		Sub Total	**9**			
OAU_SVG	OAU_SVG 103	Introduction to Photogrammetry	3	C	30	
	OAU_SVG 105	Practical Surveying	2	C	-	45
	OAU_SVG 107	Practical Photogrammetry	1	C	-	45
	OAU_SVG ARC 103	Graphics Communication I	2	C	15	45
		Sub Total	**8**			
		Total	**17**			

100 Level Rain

100 Level Rain	**Course Code**	**Course Title**	**Units**	**Status**	**LH**	PH
CCMAS	GST 112	Nigerian Peoples and Culture	2	C	30	-
	PHY 102	General Physics II	2	C	30	-
	MTH 102	Elementary Mathematics II	3	C	45	-
		Sub Total	**7**			
OAU_SVG	OAU_SVG 102	Introduction to Remote Sensing	3	C	30	
	OAU_SVG 104	Introduction to Cartography	3	C	30	

	OAU_SVG ARC 104	Graphics Communication II	2	C	**15**	**45**
	OAU_URP 104	Basic Elements of Planning	2	C	30	
		Sub Total	**10**			
		Total	**17**			

200 Level Harmattan

200 level	Course Code	Course Title	Units	Status	LH	PH
CCMAS	ENT 211	Entrepreneurship and Innovation	2	C	15	45
	SVG 201	Basic Surveying I	2	C	15	45
	SVG 202	Cadastral Surveying I	2	C	15	45
	SVG 203	Field Astronomy	2	C	15	45
	SVG 207	Surveying Computations	2	C	30	-
	SVG 209	Surveying Instrumentation	2	C	15	45
	*GST 111	Communication in English	2	C	15	45
	*MTH 101	Elementary Mathematics I	3	C	45	-
		Sub Total	**12 / *(17)**			
OAU_SVG	OAU_SVG 211	Practical Geoinformatics I	2	C		45
	OAU_CSC 201	Computer Programming I	3	C	30	45
		Sub Total	**5**			
		Total	**17 / *(22)**			

***Additional courses for Direct Entry candidates**

200 Level Rain

200 level	Course Code	Course Title	Units	Status	LH	PH
CCMAS	GST 212	Philosophy, Logic and Human existence	2	C	30	-
	SVG 206	Computer Applications in Surveying	2	C	15	45
	SVG 208	Basic Surveying II	2	C	15	45
	SVG 205	Cadastral Surveying II	2	C	15	45
	SVG 204	Photogrammetry I	2	C	15	45
	SVG 210	Geodetic Astronomy	2	C	15	45
	*GST 112	Nigerian Peoples and Culture	2	C	30	-
	*MTH 102	Elementary Mathematics II	3	C	45	-
		Sub Total	**12 *(17)**			

OAU_SVG	OAU_SVG 210	Fundamentals of Cartography	3	C	30	-
	OAU_SVG 212	Practical Geoinformatics II	2	C		45
		Sub Total	**5**			
		Total	**17 *(22)**			

***Additional courses for Direct Entry candidates**

300 Level Harmattan

300 level	**Course Code**	**Course Title**	**Units**	**Status**	**LH**	**PH**
CCMAS	SVG 301	Photogrammetry II	2	C	15	45
	SVG 303	Mining and Special Survey	2	C	15	45
	SVG 304	Topographic Surveying	2	C	15	45
	SVG 305	Cadastral Surveying III	2	C	15	45
	SVG 307	Adjustment Computation I	2	C	30	-
	SVG 309	Geographic Information System	2	C	15	45
		Sub Total	**12**			
	OAU_SVG 311	Practical Geoinformatics III	2	C		45
OAU_SVG	OAU_CSC 305	Introduction to Database Systems	3	C	30	45
	OAU_SVG 313	Spatial Data structure	2	C	15	45
		Sub Total	**7**			
		Total	**19**			

300 Level Rain

300 level	**Course Code**	**Course Title**	**Units**	**Status**	**LH**	**PH**
CCMAS	GST 312	Peace and Conflict Resolution	2	C	30	-
	ENT 312	Venture Creation	2	C	15	45
	SVG 302	Remote Sensing I	2	C	15	45
	SVG 306	Geodetic Surveying	2	C	15	45
	SVG 308	Engineering Surveying	2	C	15	45
		Sub Total	**10**			
OAU_SVG	OAU_SVG 312	Digital Mapping and Spatial Data Management	2	C	30	45
	OAU_SVG 314	Potential Theory and Spherical Harmonics	2	C	30	-

	OAU_SVG 316	Practical Geoinformatics IV	2	C		45
	OAU_SVG 318	Spatial Data Acquisition Techniques	2	C	30	
		Sub Total	**8**			
		Total	**18**			

400 Level Harmattan

400 level	**Course Code**	**Course Title**	**Units**	**Status**	**LH**	**PH**
CCMAS	SVG 401	Hydro-graphic Surveying I	2	C	15	45
	SVG 403	Map Projection	2	C	30	-
	SVG 404	Adjustment computation II	2	C	30	-
	SVG 405	Photogrammetry III	2	C	15	45
	SVG 406	Remote Sensing II	2	C	15	45
		Sub Total	**10**			
OAU_SVG	OAU_URP 407	Planning Law and Administration	3	C	45	
	OAU_SVG 407	Safety and Swimming in Surveying	1	C	15	45
	OAU_SVG 408	Geospatial Seminar	2	C	30	-
		Sub Total	**6**			
		Total	**16**			

400 Level Rain

400 level	**Course Code**	**Course Title**	**Units**	**Status**	**LH**	**PH**
CCMAS	SVG 402	SIWES	6	C	-	270
		Sub Total	**6**			
OAU-SVG	OAU_SVG 200	SWEP	3	C	45	
	OAU_SVG 300	SIWES I	6	C	90	
		Sub Total	**9**			
		Total	**15**			

500 Level Harmattan

500 level	Course Code	Course Title	Units	Status	LH	PH
CCMAS	SVG 503	Hydro-graphic Surveying II	2	C	15	45
	SVG 505	Photogrammetry IV	2	C	15	45
	SVG 506	Research Method	2	C	30	-
		Sub Total	**6**			
OAU_SVG	OAU_SVG 509	Marine Surveying	2	C	30	-
	OAU_SVG 513	Geospatial Planning and Data Analytics	2	C	30	-
	OAU_SVG 515	Principles and Applications of Geospatial Surface Modeling	2	C	30	-
	OAU_SVG 517	Survey Laws and Regulations	2	C	30	-
	OAU_SVG 519	Applied Machine Learning	2	C	30	-
		Sub Total	**10**			
		Total	**16**			

500 Level Rain

500 level	Course Code	Course Title	Unit)	Status	LH	PH
	SVG 501	Aerial Triangulation	2	C	15	45
CCMAS	SVG 502	Geometric Geodesy	2	C	30	-
	SVG 504	Satellite Geodesy	2	C	15	45
	SVG 507	Physical Geodesy	2	C	30	-
	SVG 508	Project Dissertation	4	C	-	180
		Sub Total	**12**			
OAU_SVG	OAU_SVG 516	Cadastre and Land Information Management	2	C	30	-
	OAU_SVG 518	Professional Practice and Ethics	2	C	30	-
		Sub Total	**4**			
		Total	**16**			

D.
i. List of OAU 30% Courses

S/N	Course Code	Course Title	Units	Status
1	OAU_SVG 103	Introduction to Photogrammetry	3	C
2	OAU_SVG 105	Practical Surveying	2	C
3	OAU_SVG 107	Practical Photogrammetry	1	C
4	OAU_SVG 102	Introduction to Remote Sensing	3	C
5	OAU_SVG 104	Introduction to Cartography	3	C
6	OAU_ARC 103	Graphics Communication I	2	C
7	OAU_ARC 104	Graphics Communication II	2	C
8	OAU_URP 104	Basic Elements of Planning	2	C
9	OAU_CSC 201	Computer Programming I	3	C
10	OAU_SVG 210	Fundamentals of Cartography	3	C

11	OAU_SVG 211	Practical Geoinformatics I	2	C
12	OAU_SVG 212	Practical Geoinformatics II	2	C
13	OAU_CSC 305	Introduction to Database Systems	3	C
14	OAU_SVG 311	Practical Geoinformatics III	2	C
15	OAU_SVG 312	Digital Mapping and Spatial Data Management	2	C
16	OAU_SVG 313	Spatial Data Structure	2	C
17	OAU_SVG 314	Potential Theory and Spherical Harmonics	2	C
18	OAU_SVG 318	Spatial Data Acquisition Techniques	2	C
19	OAU_SVG 316	Practical Geoinformatics IV	2	C
20	OAU_SVG 408	Geospatial Seminar	2	C
21	OAU_SVG 407	Safety and Swimming in Surveying	1	C
22	OAU_URP 407	Planning Law and Administration	3	C
23	OAU-SVG 200	SWEP	3	C
24	OAU_SVG 300	SIWES I	6	C
25	OAU_SVG 517	Survey Laws and Regulations	2	C
26	OAU_SVG 519	Applied Machine Learning	2	C
27	OAU_SVG 513	Geospatial Planning and Data Analytics	2	C
28	OAU_SVG 515	Principles and Applications of Geospatial Surface Modeling	2	C
29	OAU_SVG 509	Marine Surveying	2	C
30	OAU_SVG 518	Professional Practice and Ethics	2	C
31	OAU_SVG 516	Cadastre and Land Information Management	2	C
		Total	**72**	

ii. List of CCMAS 70% Courses

S/N	Course Code	Course Title	Units	Status	LH	PH
1	GST 111	Communication in English	2	C	15	45
2	PHY 101	General Physics I	2	C	30	-
3	PHY 107	General Physics Practical I	1	C	-	45
4	MTH 101	Elementary Mathematics I	3	C	45	-
5	SVG 101	Introduction to Surveying and Geo informatics	1	C	15	-
6	GST 112	Nigerian Peoples and Culture	2	C	30	-
7	PHY 102	General Physics II	2	C	30	-
8	MTH 102	Elementary Mathematics II	3	C	45	-
9	ENT 211	Entrepreneurship and Innovation	2	C	15	45
10	SVG 201	Basic Surveying I	2	C	15	45
11	SVG 202	Cadastral Surveying I	2	C	15	45
12	SVG 203	Field Astronomy	2	C	15	45
13	SVG 207	Surveying Computations	2	C	30	-
14	SVG 209	Surveying Instrumentation	2	C	15	45
15	GST 212	Philosophy, Logic and Human existence	2	C	30	-
16	SVG 206	Computer Applications in Surveying	2	C	15	45
17	SVG 208	Basic Surveying II	2	C	15	45

18	SVG 205	Cadastral Surveying II	2	C	15	45
19	SVG 204	Photogrammetry I	2	C	15	45
20	SVG 210	Geodetic Astronomy	2	C	15	45
21	SVG 301	Photogrammetry II	2	C	15	45
22	SVG 303	Mining and Special Survey	2	C	15	45
23	SVG 304	Topographic Surveying	2	C	15	45
24	SVG 305	Cadastral Surveying III	2	C	15	45
25	SVG 307	Adjustment Computation I	2	C	30	-
26	SVG 309	Geographic Information System	2	C	15	45
27	GST 312	Peace and Conflict Resolution	2	C	30	-
28	ENT 312	Venture Creation	2	C	15	45
29	SVG 302	Remote Sensing I	2	C	15	45
30	SVG 306	Geodetic Surveying	2	C	15	45
31	SVG 308	Engineering Surveying	2	C	15	45
32	SVG 401	Hydro-graphic Surveying I	2	C	15	45
33	SVG 403	Map Projection	2	C	30	-
34	SVG 404	Adjustment computation II	2	C	30	-
35	SVG 405	Photogrammetry III	2	C	15	45
36	SVG 406	Remote Sensing II	2	C	15	45
37	SVG 402	SIWES	6	C	-	270
38	SVG 501	Aerial Triangulation	2	C	15	45
39	SVG 503	Hydro-graphic Surveying II	2	C	15	45
40	SVG 505	Photogrammetry IV	2	C	15	45
41	SVG 502	Geometric Geodesy	2	C	30	-
42	SVG 504	Satellite Geodesy	2	C	15	45
43	SVG 506	Research Method	2	C	30	-
44	SVG 507	Physical Geodesy	2	C	30	-
45	SVG 508	Project Dissertation	4	C	-	180
	TOTAL		**96**			

iii. List Of Courses: CCMAS 70% and OAU 30% Per Levels on Sessional Bases

S/N	Level	Course Code	Course Title	Unit	Status
1		GST 111	Communication in English	2	C
2		PHY 101	General Physics I	2	C
3		PHY 107	General Physics Practical I	1	C
4		MTH 101	Elementary Mathematics I	3	C
5		SVG 101	Introduction to Surveying and Geoinformatics	1	C
6		OAU_SVG 103	Introduction to Photogrammetry	3	C
7	**100 Level**	OAU_SVG 105	Practical Surveying	2	C
8		OAU_SVG 107	Practical Photogrammetry	1	C

9		GST 112	Nigerian Peoples and Culture	2	C
10		PHY 102	General Physics II	2	C
11		MTH 102	Elementary Mathematics II	3	C
12		OAU_SVG 102	Introduction to Remote Sensing	3	C
13		OAU_SVG 104	Introduction to Cartography	3	C
14		OAU_ARC 103	Graphics Communication 1	2	C
		OAU_ARC 104	Graphics Communication II	2	C
15		OAU_URP 104	Basic Elements of Planning	2	C
				34	
S/N	**Level**	**Course Code**	**Course Title**	**Unit**	**Status**
1		ENT 211	Entrepreneurship and Innovation	2	C
2		SVG 201	Basic Surveying I	2	C
3		SVG 202	Cadastral Surveying I	2	C
4		SVG 203	Field Astronomy	2	C
5		SVG 207	Surveying Computations	2	C
6		SVG 209	Surveying Instrumentation	2	C
7	**200 Level**	OAU_SVG 211	Practical Geoinformatics I	2	C
8		OAU_CSC 201	Computer Programming I	3	C
9		GST 212	Philosophy, Logic and Human existence	2	C
10		SVG 206	Computer Applications in Surveying	2	C
11		SVG 208	Basic Surveying II	2	C
12		SVG 205	Cadastral Surveying II	2	C
13		SVG 204	Photogrammetry I	2	C
14		SVG 210	Geodetic Astronomy	2	C
15		OAU_SVG 210	Fundamentals of Cartography	3	C
16		OAU_SVG 212	Practical Geoinformatics II	2	C
18		*MTH 101	Elementary Mathematics I	3	C
19		*MTH 102	Elementary Mathematics II	3	C
20		*GST 111	Communication in English	2	C
21		*GST 112	Nigerian Peoples and Culture	2	C
***Additional courses for direct entry candidates**				**34 / *(44)**	
S/N	**Level**	**Course Code**	**Course Title**	**Unit**	**Status**
1		SVG 301	Photogrammetry II	2	C
2		SVG 303	Mining and Special Survey	2	C
3		SVG 304	Topographic Surveying	2	C
4		SVG 305	Cadastral Surveying III	2	C
5		SVG 307	Adjustment Computation I	2	C
6		SVG 309	Geographic Information System	2	C
7		OAU_SVG 311	Practical Geoinformatics III	2	C
8		OAU_CSC 305	Introduction to Database Systems	3	C
9		OAU SVG 313	Spatial Data structure	2	C
10	**300 Level**	OAU_SVG 318	Spatial Data Acquisition Techniques	2	C
11		GST 312	Peace and Conflict Resolution	2	C

12		ENT 312	Venture Creation	2	C
13		SVG 302	Remote Sensing I	2	C
14		SVG 306	Geodetic Surveying	2	C
15		SVG 308	Engineering Surveying	2	C
16		OAU_SVG 312	Digital Mapping and Spatial Data Management	2	C
17		OAU SVG 314	Potential Theory and Spherical Harmonics	2	C
18		OAU SVG 316	Practical Geoinformatics IV	2	C
				37	
S/N	**Level**	**Course Code**	**Course Title**	**Unit**	**Status**
1		SVG 401	Hydrographic Surveying I	2	C
2		SVG 403	Map Projection	2	C
3		SVG 404	Adjustment computation II	2	C
4		SVG 405	Photogrammetry III	2	C
5		SVG 406	Remote Sensing II	2	C
6		OAU_URP 407	Planning Law and Administration	3	C
7	**400 Level**	OAU_SVG 407	Safety and Swimming in Surveying	1	C
8		OAU_SVG 408	Geospatial Seminar	2	C
9		SVG 402	SIWES	6	C
10		OAU_SVG 200	SWEP	3	C
11		OAU SVG 300	SIWES I	6	C
				31	
S/N	**Level**	**Course Code**	**Course Title**	**Unit**	**Status**
1		SVG 503	Hydrographic Surveying II	2	C
2		SVG 505	Photogrammetry IV	2	C
3		SVG 506	Research Method	2	C
4		OAU_SVG 509	Marine Surveying	2	C
5		OAU_SVG 513	Geospatial Planning and Data Analytics	2	C
6		OAU_SVG 515	Principles and Applications of Geospatial Surface Modeling	2	C
7	**500 Level**	OAU SVG 517	Survey Laws and Regulations	2	C
8		OAU SVG 519	Applied Machine Learning	2	C
9		SVG 501	Aerial Triangulation	2	C
10		SVG 502	Geometric Geodesy	2	C
11		SVG 504	Satellite Geodesy	2	C
12		SVG 507	Physical Geodesy	2	C
13		SVG 508	Project Dissertation	4	C
14		OAU_SVG 516	Cadastre and Land Information Management	2	C
15		OAU_SVG 518	Professional Practice and Ethics	2	C
				32	

E. Course Description

i OAU 30% Course Contents

OAU_SVG 102: Introduction to Remote Sensing (3 Unit)

Definition of remote sensing concept, Review of properties of electromagnetic waves and application to earth measurement. Formation, modulation and propagation. Principles of phase comparison. Group velocity: transmitters, receivers, antenna. Optics, spherical waves, interference and diffraction, thin film, crystal diffraction, holography, dispersion and scattering. Electromagnetic Distance Measuring (EDM) instruments. Errors: instrumental and atmospheric. Interferometric methods of baseline measurements.

OAU_SVG 103: Introduction to Photogrammetry (3 Unit)

Introduction and historical sketch of the developments in the concept, instrumentation and methods of photogrammetry and remote sensing; basic concepts and definitions; parts of an aerial photograph and uses of aerial photographs; use and care of pocket and mirror stereoscopes; monocular and binocular viewing; stereoscopic observations; photographic processes and materials; photo interpretation; basic principles of remote sensing.

OAU_SVG 104: Introduction to Cartography (3 Units)

Introduction and historical sketch of the developments in the concept; instrumentation and methods of cartography; definition and objectives of cartography; elements of plan and map construction; drawing surfaces and tools, media of cartographic communication such as lettering, typography, conventional signs; colours, scales and relationships; applications to the plotting of chain surveying, and compass traverse.

OAU_SVG 105: Practical Surveying (2 unit)

Demonstration of the adjustment, use and care of the surveying instruments. Practical plane surveying of specified area at a scale of 1: 1000 involving (a) compass traversing, (b) basic grid levelling and chain surveying and fixing of details of natural and man-made features.

OAU_SVG 107: Practical Photogrammetry (1 unit)

Laboratory exercises on the practical application of OAU_SVG 103: The uses of the characteristics of photo imagery in interpretation for topographic mapping. Small-scale photo interpretation. Exercise on photo pointing, parallax heightening, map revision, rectification, orthophotography and derivation of metric data from aerial photographs. Care of photogrammetric instruments.

OAU_ARC 103: Graphics Communication 1 (2 Units)

Drawing tools. Drawing materials. The representation of common views. Graphic presentation using various media. Sketching for design development. Descriptive geometry. Orthographic projections of simple and complex geometric solids. Isometric, axonometric. Oblique and perspective views and lettering.

OAU_ARC 104: Graphics Communication II (2 Units)

Uses of graphics in architecture. Graphic thinking and building representation. Representation of building elements and materials. Representations of building elements and materials in plans. Representations of building elements and materials in elevations and sections. Projection techniques for shade and shadow construction. 3-Dimensional drawings of building exteriors. 3- Dimensional drawings of building interiors. Oblique drawings. Isometric drawings. Axonometric drawings. Perspective drawings and rendering.

OAU_URP 104: Basic Elements of Planning (2 units)

Introduction to basic elements of planning. Definition of urban and regional planning. Meaning and scope of planning. Types of development plans. Elements of development plan. Characteristics of development plans. Components of urban landuses. Theory of planning. Theory in planning. Planning process – Survey-Plan-Analysis. Types of survey. Space standard. Concept of Garden City. Neighbourhood concept. Components of Neighbourhood units. New town development. Characteristics of new town. Environmental areas and civic design.

OAU_CSC 201: Computer Programming I (3 Units)

Introduction to computer programming. Functional programming; Declarative programming; Logic programming; Scripting languages. Introduction to object-orientation as a technique for modelling computation. Introduction of a typical object-oriented language, such as Java. Basic data types, variables, expressions, assignment statements and operators. Basic object-oriented concepts: abstraction; objects; classes; methods; parameter passing; encapsulation. Introduction to Strings and string processing; Simple I/O; control structures; Arrays; Simple recursive algorithms; inheritance; polymorphism.

OAU_SVG 210: Fundamental Cartography (3 Units)

Reading and interpretation of large and small scale maps including hydrographic charts. Methods of referencing map features; the rationale and the methods of choice and change of scales and colours; methods of relief representation; and graphic and mechanical measurement of areas and slopes. Applications to plotting (scale 1: 1000), contouring and fair drawing of the field notes collected in the practical exercise of SVG 203. Introduction to digital mapping, definitions; components of digital mapping system: input and output devices; digital mapping software and their capabilities; execution of digital mapping project; establishment of digital topographic database.

OAU_SVG 211: Practical Geoinformatics I (2 Units)

Based on intensive fieldwork focused on Basic Plane Surveying. Students will receive hands-on training in the proper use, adjustment, and care of essential equipment, including compasses, theodolites, and leveling instruments. Key activities involve the practical execution of linear surveys, compass and theodolite traversing to establish control networks, and various leveling methods (like spirit and grid leveling) to determine elevations. Accurate field note-keeping and booking procedures for all data acquired in the field are emphasized, forming the foundation of data quality control. Practical sessions for Cadastral Surveying involve hands-on exercises in the demarcation and re-establishment of land boundaries according to legal and technical specifications, a core skill for property surveys. Practical session for field astronomy on solar and stellar observations using a theodolite to determine the true azimuth (bearing) of a line. These advanced field observations are crucial for orienting extensive survey networks and providing a high-level spatial control reference. Hands-on work with Computer-Aided Drafting (CAD) and basic GIS software to transform the processed field data into a tangible output, such as a final survey plan or map (e.g., at a scale of 1:1000), including the plotting of features and the creation of contours, bridging traditional fieldwork with modern digital mapping and geoinformatics practice.

OAU_SVG 212: Practical Geoinformatics II (2 Units)

Control surveying, establishment of 2nd order planimetric control using GNSS method of RTK and post-processing, traversing method and Triangulation method. Least square adjustment of traverse legs. Error analysis of complex traversing to establish robust control networks. Topographic surveying and detailed field exercises on fixing natural and man-made features. Height determination and detail fixing using. Laboratory exercises involving the care and use of stereoscopes to conduct stereoscopic observation of aerial photographs. Practical work here includes photo interpretation, photo-pointing, and the derivation of metric data such as height determination using parallax. Fieldwork practical execution of precise astronomical observations of celestial bodies, typically the sun or stars, using surveying instruments to determine accurate geodetic azimuths and time. These practical sessions focuses on meticulous instrument setup, correct observational procedures, and the rigorous computation and reduction of the field data to ensure high-accuracy directional control for large-scale survey networks. Hands-on computational phase involves the application of specialized surveying and mapping software to process, check, and adjust field data acquired from traversing and geodetic observations. Students will perform fundamental digital mapping operations, including data input, georefernecing, coordinate transformations, and the use of digital photogrammetric outputs. The ultimate practical output is the production of a finished, scaled digital topographic map or survey plan, demonstrating proficiency in data processing, quality control, and professional cartographic.

OAU_CSC 305: Introduction to Database Systems (3 Units)

Information Management Concepts. Information storage & retrieval. Information management applications. Information capture and representation. Analysis and indexing - search, retrieval, information privacy. Integrity and security. Scalability, Efficiency and Effectiveness. Introduction to database systems. Components of database systems. DBMS functions. Database architecture

and data independence. Database query language. Conceptual models. Relational data models. Semi-structured data models. Relational theory and languages. Database Design. Database security and integrity. Introduction to query processing and optimization. Introduction to concurrency and recovery.

OAU_SVG 311: Practical Geoinformatics III (2 Units)

The first core area is the spatial data acquisition using state-of-the-art remote sensing and satellite-based techniques, combined with high-precision ground control. The practical should further focus on Geodetic Surveying, moving beyond local plane surveying to control large-scale networks. Key practical exercises include the precise operation of Global Navigation Satellite System (GNSS) equipment (like GPS receivers) for high-accuracy data acquisition as well as Geodetic leveling operations. The second core area is Hands-on activities on static, rapid static, and RTK (Real-Time Kinematic) GNSS surveying methods, including proper network design, monumentation, data logging, and processing GNSS observations using specialized software to derive high-precision 3D coordinates. The third core area is for practical sessions focusing on analysis of the electromagnetic spectrum, focusing on how different wavelengths are used to collect data, including the practical implications of atmospheric interaction. Hands-on experience in Digital Image Processing (DIP), using Remote Sensing (RS) software to load, enhance, and manipulate satellite and aerial imagery. Core activities include performing image enhancement techniques (e.g., contrast stretching, filtering), conducting supervised and unsupervised image classification to create thematic maps (e.g., land cover/land use), and performing basic geometric and radiometric corrections on digital imagery. The third core areas is that students should use remote sensing and field method approach to acquire data and store into GIS. Simple image georefernecing, groundtruthing and feature class and types determination. GIS database creation and the implementation of the 3 phase of Database creation. Spatial analysis by query, interpolation, modelling and analyzing spatial relationship.

OAU_SVG 312: Digital mapping and Spatial Data Management (2 Units)

Definition; Digital Mapping Input and output Devices: (Digitizers and scanners; Digital Mapping Output Devices: Hard copy output devices (Plotters), VDU, printer, etc). Data sources and georefernecing, Principles and method of data conversion, coordinate and reference system transformation for orthogonal and perspective projections. Data models and structures for computer graphics. Digital cartography principles; generalization, symbolization, visualization, hill shading, visual hierarchy and labelling for thematic and topographical digital maps. Digital mapping production flow line (from photogrammetry, Remote Sensing and Land Surveying to presentation), Digital Mapping software packages; Web mapping; crowd-sourcing for community mapping; cloud computing. Concept of infrastructure; definition of spatial data infrastructure (SDI); components of SDI: geospatial standards, metadata, clearinghouse; Geo- portals; legal and policy aspects of SDI.

OAU_SVG 313: Spatial Data Structure (2 Units)

Review of Raster Data Model, examining its structure as a regular grid of cells and its use in representing continuous phenomena like elevation, temperature, or satellite imagery. Vector Data Model and its geometric primitives (points, lines, and polygons) and coordinate pairs to represent discrete features. The advantages and disadvantages of each model in terms of storage, analysis, and data realism, and introduces concepts of data compression, resolution, and the general flow of spatial data acquisition. Concept of Topology, building spatial relationships between features (e.g., ensuring adjacent polygons share a boundary without gaps or overlaps). Simple Data Structure (e.g., Spaghetti Model) and robust Topological Data Structures (e.g., DIME and TIGER files). Analyzing connectivity, adjacency, and containment. Index structures designed such as Quadtrees (for raster data) and various Spatial Indexing Techniques (e.g., R-trees, K-D-B trees). Management of non-spatial information associated with geographic features (Attribute Data) linking GIS to a relational database. Geodatabase Models; including the Relational Data Model and Object-Relational Model, and their role in structuring and validating complex spatial data. Key concepts Entity-Relationship (E-R) Modeling, data normalization and Structured Query Language (SQL). The architecture of Database Management Systems (DBMS) designed for geospatial data (e.g., PostgreSQL/PostGIS, Oracle Spatial).

OAU_SVG 314: Potential Theory and Spherical Harmonics (2 Units)

Fundamentals of potential theory; Harmonic functions, Legendre's functions and spherical harmonics, Boundary value problems of potential theory and their applications to the representation of earth's gravity field.

OAU_SVG 318: Spatial Data Acquisition Techniques (2 Units)

Basic concepts of positioning, positioning on dynamic surface, control establishment, electronic surveying, and the theory of GNSS positioning, fundamentals of GNSS observable: pseudo range and Phase carrier of GPS position: Static, DGPS, kinematic, pseudo-kinematic, rapid-static, on-the-fly and Real-Time Kinematic (RTK). Planning a GPS survey: single difference, double difference, and triple difference. Baseline processing, network adjustment, practice of post-processing and RTK positioning of GPS data, mapping using Unmanned Aerial Systems (drone), data processing and orthophoto production. Datum shift and determination of transformation parameters from different models. Application studies on location technology with an emphasis on GNSS, but also other radio signals, inertial sensors, digital maps (for map matching), vehicle odometers, compasses, sonar/radar and cameras. Principles of citizen science and crowd sourcing using low cost sensors and smart phones to gather spatial data. Spatial analytics for spatial intelligence.

OAU_SVG 316: Practical Geoinformatics IV (2 Units)

The first core area is high-precision data acquisition for Engineering Surveying and establishing wide-area geodetic. Practical exercises in engineering surveying include the setting out of infrastructure projects (e.g., roads, pipelines, and building corners) using techniques like curve ranging, profiling, and volume determination. For geodetic surveying, students will perform

rigorous observational procedures for triangulation and trilateration networks, learning to implement proper measurement protocols and error handling for high-accuracy ground control. This includes practical sessions on collecting and processing GNSS (GPS) data for network densification and achieving geodetic standards. The second core area focuses on advanced image-based mapping techniques, practical work shifts from single-photo interpretation to working with stereo pairs and digital models. Students will perform hands-on exercises in aerotriangulation, which involves using image measurements and ground control to establish accurate coordinates for all image points. Further practical activities involve mapping using Unmanned Aerial Systems (drone), data processing and orthophoto production, generating Digital Elevation Models (DEMs) and orthophotos from UAS, crucial steps in transforming aerial photos into accurate, scaled maps. Production of large-scale digital topographic map activities for demonstration of mastery of data integration, rigorous computational techniques, and professional cartographic output generation.

OAU_SVG 200: Student Work Experience Programme (SWEP 1) (3 Units)

SWEP I for students in Surveying and Geoinformatics (SVG) is typically a practical, intensive program designed to introduce students to the foundational, hands-on skills of the profession. This is usually held at the end of Part II (200 Level) to prepare students for their first SIWES industrial attachment. Based on the typical structure for Surveying and Geoinformatics programs, the program focuses on mastering classical fieldwork techniques and basic computation methods.

OAU_SVG 300: Student Industrial Work Experience Scheme (SIWES I): (6 Units)

Student Industrial Work Experience Scheme is a core course for Surveying and Geoinformatics students. Its content is primarily determined by the practical experience gained during field and industrial attachment. It is assessed based on a structured reflection and demonstration of industrial skills gained by students and recorded in the logbook and technical report, covering both field and office aspects of the profession.

OAU_SVG 407: Safety and Swimming in Surveying (1 units)

Definition of safety, Importance of safety, the general rule regarding first aid treatment, Safety of equipment and people at work. Prevention and protection against the effects of fires/ chemical splash, Right attitude to safety methods of reporting accidents:- factual reporting, Road Traffic Accident (RTA), Loss To Injury (LTI). Near-misses, Total man hours, Road traffic signs and defensive driving, Rudiments of swimming, buoyancy, arm and leg actions, Safety rules in swimming. Stamina development, Different styles of swimming. The art of suspension in swimming. Maintenance of pool equipment and facilities. Use of swimming floats and pods.

OAU_SVG 408: Geospatial Seminar (2 Units)

Critical thinking, conceptual skills building, conceptual framework, what is concept, defining conceptual framework, features of conceptual framework, functions of conceptual framework , components of a conceptual framework, sources and methods of building conceptual framework, how to read and summarize a scientific paper, steps in reading a scientific paper, summarizing a scientific paper, types of summaries, steps in summarizing a scientific paper, steps for organizing

summary of many scientific papers, concept note development and presentation of project proposal. Research design and methodological choices: definitions of qualitative and quantitative methods, difference between qualitative and quantitative method, characteristics of quantitative and qualitative research. Key terms in research building: causation and association/correlation, accuracy vs. Reliability, reliability types, type 1 and type 2 error, population and sample.

OAU_URP 407: Planning Law and Administration (3 Units)

Purpose and legal basis of planning legislation in Nigeria; General introduction to the legal process of legislation, contract, adjudication and the concept of justice; A review of the evolution of law relating to land and urban and regional planning in Nigeria; A critical review of some urban and regional planning laws an acts, Urban Renewal Act, Anti-Pollution Act; Recent trends in planning legislation; Land tenure and land policy; A review of the misuse of fundamental rights under the Nigeria constitution relating to land, land development. The Land Use Act, its provisions, limitations and implications for planning, building by-laws and their applications to regulate urban growth and direct development; Legal aspect of review and approval process of land use plans. Planning laws as a mechanism for solving urban problems of health, congestion and pollution. Introduction to the elements and principles of administration, political structure and bureaucracy. The structure of federal, State and Local Governments; Their planning scope and functions; Functions, power structures and resources of Administration of inter-regional and intra-regional planning. Management and decision making at various levels and within parastatals and line ministries; the administration of implementation of Urban Development plans; the legal provisions, the administrative structure and financing.

OAU_SVG 509: Marine Surveying (2 Units)

Coastal Engineering. Siltation and Erosion. Coastal zone management. Demarcation of harbour limits. Shipping and harbour laws. Position fixing. Large scale surveys, dredging. Effects of wind and wave on seabed. Oceanographic equipment. Tidal Current Measurement. Reliability of Charts: Information on charts, navigation aids. Maritime boundaries: Territorial sea and International waters, baselines, continental shelf, Exclusive Economic Zone (EEZ), contiguous zones. Case studies on maritime boundary disputes. Maritime boundary demarcation: Equi-ratio and equi-distant methods, beacon fishing, pollution and Mineral Prospecting/exploitation zones. Nigerian Territorial boundaries Arch pelagic States.

OAU_SVG 513: Geospatial Planning and Data Analytics (2 Units)

Spatial analysis Modelling; vector –based (geoprocessing), buffering, overlay (intersect, union), clipping, dissolve and feature selections by attribute. Raster based analysis by map Algebra in performing cell-by-cell calculations using operating functions for terrain analysis, slope, aspect, visibility and hydrological modelling. Network analysis for shortest path, closest facilities, service area mapping etc. Spatial pattern identification, cluster, outliers modeling and spatial autocorrelation using applicable models. Kernel density estimation for point pattern analysis, hot spot analysis, geostatistical interpolations techniques for prediction of unmeasured values. Spatial econometrics and Geographically Weighted Regression. Big data and cloud GIS. Management of Information System; Project Planning and Execution; Costing of geospatial projects; Building of GIS; User Requirement studies, feasibility studies, functional requirements; pilot project and

bench marking; staff motivation; cost-benefit appraisal. Design and implementation of prototype for various applications such as resources management, environmental management, Public Utility Management, Precision Agriculture, Emergency Management, Navigation, Urban Planning.

OAU_SVG 515: Principles and Applications of Geospatial Surface Modeling (2 Unit)

Introduction to LiDAR and Laser Scanning, UAV (Drone) Photogrammetry: Specific workflows, flight planning parameters (overlap, ground sampling distance - GSD), and challenges unique to low-altitude imaging. Conditions and selection of Ground Control Points (CGP_S), Direct Georefernecing (DG): Integration of Global Navigation Satellite System (GNSS) and Inertial Measurement Unit (IMU). Digital Surface Models (DSM) vs. Digital Terrain Models (DTM). Introduction to generating textured 3D models (CityGML, LODs) from aerial and terrestrial imagery, and the concept of Oblique Photogrammetry. Techniques for merging multiple scan/flight blocks (e.g., Iterative Closest Point - ICP) and combining LiDAR point clouds with photogrammetric point clouds. Volumetric and Change Detection Analysis: Calculating volumes (e.g., stockpiles, cut-and-fill) and detecting 3D changes between multi-temporal DTMs/DSMs. Accuracy Assessment and Quality Control (QC): Statistical methods for evaluating the accuracy of orthophoto, DTMs, and 3D models (RMSE, check points etc). Terrestrial Photogrammetry: Using ground-based cameras for industrial inspection, cultural heritage documentation, and architectural mapping. Structure-from-Motion (SfM) Principles, review of automated photogrammetric pipeline used by most software (Agisoft Metashape, Pix4D, etc.). Handheld and Mobile Laser Scanning (MLS), overview of modern methods for urban and indoor data capture and their integration with aerial data.

OAU_SVG 516: Cadastre and Land Information Management (2 Units)

The concept and benefits of cadastre. The historical development and the technical requirements for the development of cadastre. The concept of the multi-purpose cadastre. The concept of land information management. Information storage, maintenance and retrieval. Data storage media. Introduction to computerized data system; data organization; cadastral databases development and database management systems. Requirements for land information management including referencing framework, detailed surveying and mapping. Cost benefit analysis of land information system.

OAU_SVG 517: Survey Laws and Regulations (2 Units)

The evolution of the Nigerian Survey Laws and Regulations. Study of the Laws of the Federal Republic of Nigeria Acts of Parliament, Military Decrees and Edicts that relate to the Surveying Professional practice. Comparative study of the survey laws and regulations of other countries. Federal and state departmental instructions as they relate to the execution of surveying jobs. Applications to cadastral surveying. Principles and guidelines for a National Mapping Policy. Study of the National Geoinformation Policy.

OAU_SVG 518: Professional Practice and Ethics (2 Units)

Areas of professional practice and essential services rendered. Professional bodies and their functions. Surveyors' Council of Nigeria (SURCON) and the Nigerian Institution of Surveyors (NIS). Control of the profession. Code of Ethics. Costing of Cadastral, Topographical, Engineering and Hydrographical Surveys. Costing of mapping projects. Expert evidence at the court with regard to the practice of the profession of surveying.

OAU_SVG 519: Applied Machine Learning (2 Units)

Data Preparation: Essential steps for ML, including correcting images and generating useful data layers (Feature Engineering), like vegetation indices (NDVI). Supervised Classification: Learning to map Land Cover/Land Use (LCLU) using labeled data. Use of DL algorithms like Random Forest and Support Vector Machines (SVMs) and Accuracy Check (Confusion Matrix, Accuracy Metrics). Deep Learning (DL) for Advanced Vision, Convolutional Neural Networks (CNNs): Understanding the fundamental building block of modern image analysis. Pixel-Level Mapping (Semantic Segmentation): Using DL models (like U-Net) to precisely draw the boundary of every object (e.g., roads, buildings) in an image. Using DL models to draw bounding boxes around specific objects of interest, such as cars, aircraft, or individual trees. DL for 3D Data: Applying deep learning to analyze LiDAR and photogrammetric point clouds to automatically classify 3D points (e.g., separating ground from tree canopy). Real-World Applications and Scalability Time-Series Analysis: Using ML to track changes over time (e.g., monitoring crop health or urban growth) by analyzing multiple images taken months or years apart. Handling Big Data: Introduction to scalable analysis using cloud platforms like Google Earth Engine (GEE) to process massive datasets. Case studies review of ML implementations in areas like Disaster Response, Precision Agriculture, and Urban Planning.

ii. CCMAS 70% Course Contents

GST 112: Nigerian Peoples and Culture (2 Units)

Nigerian history, culture and art up to 1800 (Yoruba, Hausa and Igbo peoples and culture; peoples and culture of the ethnic minority groups). Nigeria under colonial rule (advent of colonial rule in Nigeria; Colonial administration of Nigeria). Evolution of Nigeria as a political unit (amalgamation of Nigeria in 1914; formation of political parties in Nigeria; Nationalist movement and struggle for independence). Nigeria and challenges of nation building (military intervention in Nigerian politics; Nigerian Civil War). Concept of trade and economics of self-reliance (indigenous trade and market system; indigenous apprenticeship system among Nigeria people; trade, skill acquisition and self- reliance). Social justices and national development (law definition and classification. Judiciary and fundamental rights. Individual, norms and values (basic Nigeria norms and values, patterns of citizenship acquisition; citizenship and civic responsibilities; indigenous languages, usage and development; negative attitudes and conducts. Cultism, kidnapping and other related social vices). Re-orientation, moral and national values (The 3R's – Reconstruction, Rehabilitation and Re-orientation; Re-orientation Strategies: Operation Feed the Nation (OFN), Green Revolution, Austerity Measures, War Against Indiscipline (WAI), War

Against Indiscipline and Corruption (WAIC), Mass Mobilization for Self-Reliance, Social Justice and Economic Recovery (MAMSER), National Orientation Agency (NOA). Current socio-political and cultural developments in Nigeria.

PHY 101: General Physics I **(2 Units)**

Space and time. Units and dimension. Vectors and scalars. Differentiation of vectors. Displacement, velocity and acceleration. Kinematics, Newton laws of motion (Inertial frames, Impulse, force and action at a distance, momentum conservation). Relative motion. Application of Newtonian mechanics, equations of motion, conservation principles in physics, conservative forces, conservation of linear momentum, kinetic energy and work. Potential energy, system of particles and centre of mass. Rotational motion; Torque, vector product, moment, rotation of coordinate axes and angular momentum. Polar coordinates, conservation of angular momentum and circular motion. Moments of inertia, gyroscopes and precession. Gravitation: Newton's law of gravitation, Kepler's Laws of planetary motion, gravitational potential energy, escape velocity, satellites motion and orbits.

PHY 102: General Physics II **(2 Units)**

Heat, temperature and temperature scales. Gas laws; general gas equation, thermal conductivity. First Law of thermodynamics, heat, work and internal energy. Reversibility, second law of thermodynamics, heat engines and entropy. Zero's law of thermodynamics, kinetic theory of gases, molecular collisions and mean free path. Elasticity, Hooke's law, Young's, shear and bulk moduli. Hydrostatics, pressure, buoyancy, Archimedes' principles. Bernoulli's equation and incompressible fluid flow. Surface tension, adhesion, cohesion, viscosity, capillarity, drops and bubbles.

PHY 107: General Practical Physics I **(1 Unit)**

Quantitative measurements. Treatment of measurement, errors and graphical analysis. Experimental techniques for studies of meters, oscilloscope, mechanical systems, electrical and mechanical resonant systems, light, heat, viscosity and others covered in PHY 101. Emphasis should be placed on the basic physical techniques for observation, measurements, data collection, analysis and deduction.

MTH 101: Elementary Mathematic I **(2 Units)**

Elementary set theory, subsets, union, intersection, complements and Venn diagrams. Real numbers, integers, rational and irrational numbers. Mathematical induction, real sequences and series. Theory of quadratic equations and binomial theorem. Complex numbers, algebra of complex numbers and the Argand diagram. De-Moivre's theorem and nth roots of unity. Circular measure, trigonometric functions of angles of any magnitude, addition and factor formulae.

MTH 102: Elementary Mathematics II **(2 Units)**

Function of a real variable, graphs, limits and idea of continuity. The derivative, as limit of rate of change. Techniques of differentiation. Extreme curve sketching. Integration as an inverse of differentiation. Methods of integration and definite integrals. Application to areas and volumes.

SVG 101: Introduction to Surveying and Geoinformatics **(2 Units)**

History of Surveying. Definition and procedural categories in Surveying. Principles, Classes and Uses of Surveying. Methods used in Surveying. Fields of study in Surveying. Practice of Surveying and Qualities of a Surveyor. National and International Surveying Organizations. Concept of Geographic Information System (GIS). Benefits and components of GIS. Definition, classes and units of measurements. Types, treatment of errors, precision and accuracy in Surveying measurements. Employment opportunities in Surveying and Geoinformatics. Basic concept, historical development and applications of Geoinformatics. Relationship among GIS, Geoinformatics and Geo-matics Engineering. Geospatial data sources. Data models, format, quality and providers.

GST 212. Philosophy, Logic and Human Existence **(2 Units)**

Scope of philosophy; notions, meanings, branches and problems of philosophy. Logic as an indispensable tool of philosophy. Elements of syllogism, symbolic logic— the first nine rules of inference. Informal fallacies, laws of thought, nature of arguments. Valid and invalid arguments, logic of form and logic of content — deduction, induction and inferences. Creative and critical thinking. Impact of philosophy on human existence. Philosophy and politics, philosophy and human conduct, philosophy and religion, philosophy and human values, philosophy and character moulding.

ENT 211: Entrepreneurship and Innovation **(2 Units)**

Concept of entrepreneurship (Entrepreneurship, Intrapreneurship/Corporate Entrepreneurship,). Theories, Rationale and relevance of Entrepreneurship (Schumpeterian and other perspectives, Risk-Taking, Necessity and opportunity-based entrepreneurship and Creative destruction). Characteristics of Entrepreneurs (Opportunity seeker, Risk taker, Natural and Nurtured, Problem solver and change agent, Innovator and creative thinker). Entrepreneurial thinking (Critical thinking, Reflective thinking, and Creative thinking). Innovation (Concept of innovation, Dimensions of innovation, Change and innovation, Knowledge and innovation). Enterprise formation, partnership and networking (Basics of Business Plan, Forms of business ownership, Business registration and Forming alliances and joint ventures). Contemporary Entrepreneurship Issues (Knowledge, Skills and Technology, Intellectual property, Virtual office, Networking). Entrepreneurship in Nigeria (Biography of inspirational Entrepreneurs, Youth and women entrepreneurship, Entrepreneurship support institutions, Youth enterprise networks and Environmental and cultural barriers to entrepreneurship). Basic principles of e-commerce.

SVG 201: Basic Surveying I **(2 Units)**

Basic principles and methods used in ranging, chaining, off-setting, measurement of tie and check lines. Principles and methods used in chain surveying. Carrying out measurements and plotting of chain survey of an area. Sources of errors, corrections and accuracy attainable in chain surveying. Principles and methods used in compass surveys. Collection of field data, processing of data and production of plan at suitable scale in compass surveying. Principles and methods, field observations, computations, sources/correction of errors and production of plans at suitable scale in plane tabling.

SVG 202: Cadastral Surveying I **(2 Units)**

History, principles and methods of dealings in land tenure system in Nigeria. Customary land tenure systems in Nigeria. Right and interests in land and rights to land and natural resources. Deeds and title registration systems. Registrable Instruments and Deed Registry. Defects of deeds registration and title registration. Title registration act, registered land act and land use decree. Comparative analysis of land administration systems. Environmental coastal zone management. Law of the sea and delimitation of maritime boundaries.

SVG 203: Field Astronomy **(2Units)**

Nature of universe and solar, stellar and satellite systems. The motion of planets, Normal orbit, Kepler's laws and perturbed orbit of satellite. The motion and the relationship of the earth and the sun/star. Stars constellations, magnitude and distance of sun/star from the earth. Solution of astronomical triangle. Celestial coordinate system. Time system, Star catalogues and charts. Uses of stars almanac. Solar and stellar observations. Processing of observations for the determination of azimuth.

SVG 204: Photogrammetry I **(2 Units)**

General introduction to photogrammetry. Relationship of photogrammetry to land surveying, Remote sensing and GIS. Aerial and terrestrial photogrammetry. Classical and digital photogrammetry. Application areas of photogrammetry. Components of photogrammetric camera, photographic processes, distortions and resolution of film-based camera. Working principles and properties of digital cameras. Aerial Photography: classification according to camera axis inclination, angular coverage and photographic materials. Geometry of photographs. Image and object space and coordinate systems, photo scale, tilt, relief displacement and ground coverage. Photographs as perspective projections and difference from maps. Uses of stereoscopes, stereo-plotters (analogue, analytical and digital), comparators and ortho-projectors. Introduction to Photo Interpretation.

SVG 205: Cadastral Surveying II **(2 Units)**

Principles and scope of cadastral surveying. Rules and regulations governing demarcation, organization and procedure for cadastral surveying. Field methods and office preparations for property surveys. Specifications for large scale cadastral surveying. Principles of sub-division of properties and layout design for surveying. Origins, establishment and re-establishment of beacons. Cadastral survey records. Intra/interstate, national and international boundaries. Control surveys. Location of sequence conveyance and reversion of right. Compensation and claim

surveys. Procedures for land in dispute surveys. Process of land registration and professional conduct of surveyors.

SVG 206: Computer Applications to Surveying (2 Units)

Introduction to basic computing, hardware and software systems. Basic computer maintenance. Flowchart, Algorithm and steps for program development in VISUAL BASIC, MATLAB and Phyton environments. Development and applications of computer routines and sub-routine for basic surveying computations like traversing, levelling, triangulation, areas and volumes of earth works. The use of computer packages for storage, processing, retrieval and analysis of geospatial data.

SVG 207: Surveying Computation (2 Units)

Basic concept and processes of surveying computations. Field and office computations, decimal and significant figures, accurate and inaccurate figures, rounding off and approximation. Care of computation machines. Methods used in surveying computation. Selection and manipulation of formulae for surveying computations. Computations of distances and angles with their various corrections. Computation of grid, magnetic, whole circle and reduced bearings from true bearing. Computations of rectangular coordinates from one station to the other, Computations of bearing and distances from coordinates of known points. Closing misclosure, treatment of misclosure and attainable accuracy. Area computations of surveying networks, Computation of omitted data in a closed network observation. Computations involved in the booking of field observations.

SVG 208: Basic Surveying II (2 Units)

Basic concept and types of traverses. Temporary and permanent adjustment of traverse instruments (Theodolite, EDM, Total Station and GPS). Field observations, Forward, Backward and area computations in traversing. Elementary adjustment of traverse network. Production of traverse plan at a suitable scale. Sources of errors and accuracy attainable in traversing. Basic concept, method and uses of leveling. Leveling with inverted staff, double and reciprocal leveling. Leveling data collection, computation and elementary adjustment of level network. Sources of errors, corrections and accuracy attainable in leveling. Principles, special features and uses of tachometry. Field observations, computations and production of plans at suitable scales from tachometry. Substance bar and its uses.

SVG 209: Surveying Instrumentation (2 Units)

Basic principles, design, construction, sources of errors, accuracy attainable, uses and care of the following surveying equipment: Ranging poles, cross staves, optical square prism. Chains, wires, lines tapes, steel bands, Survey compasses, Tripods. Effect of diurnal variations, magnetic, storms and local attraction on compass. Different types and uses of levels, parts of levels and leveling staves. Sub tense bar, Range finder, Parallax bar, Stereoscope, Plan meter, Pantograph, Coordinatograph, Plane-table and other elementary surveying Instruments. Working principles, construction, classification, calibration, types, uses, care, sources of errors, accuracy attainable, temporary and permanent adjustment of the following surveying instruments: EDMs, Theodolites, Levels, Tachometers, Altimeter, Psychomotor, Gravimeter, Doppler shift frequency, Laser, Global Positioning System (GPS), Total station Instruments targets/reflectors, Digital Plotters and

scanners, Comparators and Drone.

SVG 210: Geodetic Astronomy **(3 Units)**

Variations in celestial coordinate system. Timing with stop watch and chronometer, time conversion and variations. Determination of azimuth by hour angle of E-W stars near Elongation. Determination of hour angle of the sun. Computation by hour-angle methods of the sun and correction to astronomic azimuth. Other methods of determining astronomic azimuth. Determination of latitude by circum-meridian altitudes, programme for circum-meridian observations. Observations and computations for the independent determination of latitude and longitude. Selection of pair E-W stars. Simultaneous determination of latitude and longitude (ASTROFIX). Laplace equation and stations and geodetic uses of astronomic positions.

GST 312: Peace and Conflict Resolution **(2 Units)**

Concepts of Peace, Conflict and Security in a multi-ethnic nation. Types and Theories of Conflicts: Ethnic, Religious, Economic, Geo-political Conflicts; Structural Conflict Theory, Realist Theory of Conflict, Frustration-Aggression Conflict Theory. Root causes of Conflict and Violence in Africa: Indigene and settlers Phenomenon; Boundaries/boarder disputes; Political disputes; Ethnic disputes and rivalries; Economic Inequalities; Social disputes; Nationalist Movements and Agitations; Selected Conflict Case Studies – Tiv-Junkun; Zango Kartaf, Chieftaincy and Land disputes. Peace Building, Management of Conflicts and Security: Peace & Human Development. Approaches to Peace & Conflict Management --- (Religious, Government and Community Leaders). Elements of Peace Studies and Conflict Resolution: Conflict dynamics assessment Scales: Constructive & Destructive. Justice and Legal framework: Concepts of Social Justice; The Nigeria Legal System. Insurgency and Terrorism. Peace Mediation and Peace Keeping. Peace & Security Council (International, National and Local levels) Agents of Conflict resolution – Conventions, Treaties Community Policing: Evolution and Imperatives. Alternative Dispute Resolution, ADR. Dialogue b). Arbitration, c). Negotiation d). Collaboration. Roles of International Organizations in Conflict Resolution. (a). The United Nations, UN and its Conflict Resolution Organs. (b). The African Union & Peace Security Council (c). ECOWAS in Peace Keeping. Media and Traditional Institutions in Peace Building. Managing Post-Conflict Situations/Crisis: Refugees. Internally Displaced Persons, IDPs. The role of NGOs in Post-Conflict Situations/Crisis.

ENT 312: Venture Creation **(2 Units)**

Opportunity Identification (Sources of business opportunities in Nigeria. Environmental scanning, Demand and supply gap/unmet needs/market gaps/Market Research. Unutilized resources, Social and climate conditions and Technology adoption gap). New business development (business planning, market research). Entrepreneurial Finance (Venture capital, Equity finance, Micro finance, Personal savings, Small business investment organizations and Business plan competition). Entrepreneurial marketing and e-commerce (Principles of marketing, Customer Acquisition & Retention, B2B, C2C and B2C models of e-commerce, First Mover Advantage, E- commerce business models and Successful E-Commerce Companies,). Small Business Management/Family Business: Leadership & Management, Basic book keeping, Nature of family business and Family Business Growth Model. Negotiation and Business communication (Strategy and tactics of negotiation/bargaining, Traditional and modern business communication methods). Opportunity Discovery Demonstrations (Business idea generation presentations, Business idea Contest, Brainstorming sessions, Idea pitching).

Technological Solutions (The Concept of Market/Customer Solution, Customer Solution and Emerging Technologies, Business Applications of New Technologies - Artificial Intelligence (AI), Virtual/Mixed Reality (VR), Internet of Things (IoTs), Block chain, Cloud Computing, Renewable Energy among others. Digital Business and E- Commerce Strategies).

SVG 301: Photogrammetry II **(2 Units)**

Stereoscopy, parallax and height determination. Procedure for interior, relative and absolute orientations. Strip and block formation, stereo-model error analysis. Aero-triangulation by independent models. Stereoscopic models. Model and photo-coordinate systems, measurement and correction of image coordinates. Mathematical relationships between image and object space. Conformal, affine and projective equations. Rotation, Collinearity and Coplanarity conditions and equations. Space resection and intersection, analytical relative and absolute orientations. Introduction to analytical plotting. Terrestrial photogrammetry methods and applications. Photogrammetric data processing.

SVG 302: Remote Sensing I **(2 Units)**

Basic concept of Remote Sensing, Electromagnetic radiation and spectrum. Energy interaction with atmosphere and earth surface. Spectral reflectance curves. Passive and active sensing. Platforms, sensors and resolution. Satellite orbital types and characteristics. Overview of popular active sensors which includes MeteoSat, NOAA, LandSat, SPOT, Ikonos, and Quick Bird. Aerial survey missions such as UAVs. Radiometric, spectral, spatial and temporal resolutions and multispectral imagery. Image analysis, visual interpretation and image classification. Presentation of remote sensing data and results.

SVG 303: Mining and Special Surveys **(2 Units)**

Basic concept of mining and underground surveying techniques. Design of underground survey networks. Mine orientation, mechanical and optical shaft plumbing gyroscopic methods, laser and accuracies obtainable. Operation, sources of errors and accuracy obtainable for gyro-theodolite. Volume determination, erosion problems and crustal movements. Survey for subsidence and stability of large structures.

SVG 304: Topographic Surveying **(2 Units)**

Principles and uses of topographic maps/plan. Methods of obtaining field data for topographic surveys such as traversing, leveling, tachometry, triangulation, trilateration, intersection, resection planning, office and field recce, observations, field completion and detail survey, computations and adjustment. Contouring and production of other topographic maps/plans.

SVG 305: Cadastral Surveying III **(2 Units)**

Property laws and survey regulations. Chapter 194 of the laws of the Federation and other relevant survey legislations, decrees and their amendments. Laws in mining Surveys, Rights of way and town planning laws. Land Use Act and Land Information System. Professional practice and body.

Control of the profession and code of ethics. Costing of cadastral, topographical, engineering, hydrographic surveys and other mapping projects.

SVG 306: Geodetic Surveying (2 Units)

Basic concept of geodetic surveying. Design, specifications, observational procedure, accuracy attainable for geodetic surveying. Control surveys using triangulation, trilateration and traversing, geodetic leveling. Determination of normal, dynamic and orthometric heights. Satellite station, Laplace station and equations for the control of geodetic surveys. Sources of errors and application of appropriate corrections. Computations of geodetic coordinates. Adjustment of geodetic survey networks. Production of geodetic reports and plans. Deformation surveys and monitoring of large structure.

SVG 307: Adjustment Computation I (2 Units)

Review of matrix algebra. Theory and propagation of errors. Principles and methods of survey network adjustment. Non-least squares adjustment methods like Bowditch, transit, equal shift and unaltered bearing adjustment methods. Braced quadrilateral and centered polygon adjustment. Linear and nonlinear models, Linearization. Methods of solving systems of linear equations: Direct (ad joint, crammer, elimination/substitution, bordering, Cholesky) methods and indirect or iterative (Jacobi, Gauss-Siedel, SOR) methods. Introduction to least squares adjustment.

SVG 308: Engineering Surveying (2 Units)

Basic concept of Engineering Surveying. Feasibility study in engineering surveying. Primary line and control for mapping an area. Route Surveys. Definition, classification and uses of curves and curves formulae. Methods of setting out simple, compound, reverse, transition and vertical curves. Longitudinal and cross sectioning. Super-elevation. Setting out with theodolites, rectangular grid and polar coordinates. Establishment and construction of benchmarks and industrial setting out. Computation of area and volumes of earthwork using trapezoidal rule, Simpson and prismoidal rules, graphical and give and take methods. Cuttings and embankments, Eccentricity, Pappus theorem and Mass haul diagram.

SVG 309: Geographic Information System (2 Units)

Basic concept and uses of GIS. Components of GIS and its relationship to CAD and BIM. GIS data input, sources and integration. Spatial data models: discrete vs. continuous data, 2D, 2.5D, 3D and 4D data. Vector and raster data types. Non-spatial or attribute data. GIS reference system and geodetic datum. Data formats, standards and providers. Topology and spatial relationship. Data analysis toolbox (Selection, buffer, overlay). Data query, GIS output and visualization. Web mapping and location-based services. Temporal GIS and GIS packages.
GIS data management. Data encoding principles and equipment. Raster-to-vector conversion. Editing and error analysis. Data scale and accuracy. Database structures, ordered and indexed lists, hierarchical, network, relational, object-oriented and hybrid structure. Standards and practice, creation, maintenance, distribution of metadata. Control terrain representation and analysis. Network models and analysis. GIS applications in utility management, environmental monitoring and assessment, land management, engineering.

SVG 401: Hydro graphic Surveying I **(2 Units)**

Basic concept of hydro graphic surveying. Z-dimensional positioning at sea and on water. Depth determination, tides and mean sea level. Sounding methods and position fixing at sea. Three-point problem, Strength of fix, Sextants and station pointer. Positioning accuracies, measuring systems and sources of errors. Navigation and positioning, tides and tidal streams. Chart and Sounding datum. Mean sea level determination. Tide gauge and poles. River surveys and measurement of current and discharge.

SVG 402: SIWES **(6 Units)**

Students are attached to relevant industries, firms, research institutes with a view to developing more skills in Surveying and Geoinformatics and related areas. Provision of additional opportunities to learn more on, carry out surveying projects and write technical reports. Students are supervised during the training period and are expected to keep log-books and other records designed for the purpose of monitoring their performances.

SVG 403: Map Projection **(2 Units)**

Basic concept, theory and uses of map projection. Representation of the earth's surface by physical and mathematical figures. Geometry of the ellipse and reference ellipsoids. Coordinate systems (Cartesians, spherical and ellipsoidal), Computations on spherical and ellipsoidal surfaces. Types of geodetic reference systems, computational procedures and coordinate transformation methods. Projection systems: plane, conic, cylindrical, conformal, equidistance, equivalent, azimuthal projections, convergence, line scale factor, arc-to-chord correction. Concept of conformal projection, Transverse Mercator (TM), Nigeria Traverse Mercator (NTM) and Universal Transverse Mercator (UTM). Transformation of coordinates from geographic to NTM and UTM and vice versa.

SVG 404: Adjustment Computation II **(2 Units)**

Partitioning and diagonalization of matrix. Principles of Least Squares Adjustment (LSA). Condition equations, observation equations, combined (mixed) model equations methods of LSA. Design of weight matrices in LSA. Weight and functional constraints. Treatment of large geodetic networks. Addition and removal of observations and parameters. Statistical analysis, error ellipse and error ellipsoid. Application of LSA in Surveying and Geoinformatics.

SVG 405: Photogrammetry III **(2 Units)**

Review of photo-coordinates determination. Collinearity and Coplanarity principles, bundle and block adjustments. Processes and tasks involved in digital photogrammetry. Generic digital photogrammetry environment and integration with GIS and CAD systems. Software & hardware requirements for digital photogrammetry and digital photogrammetric work stations. Advantages and characteristics of digital images. Spatial, radiometric and spectral resolutions, geometric accuracy, digitization, sampling, quantization of grey levels and noise. Data acquisition for digital photogrammetry using digital cameras, scanners. Data compression, image processing, image enhancement and restoration techniques and image resampling.

SVG 406: Remote Sensing II **(2 Unit)**

Analytic digital image processing system. Computer imaging systems, image representation in colour space. Image sampling quantization, quality measurement, data products, storage and retrieval. Photo systems and dip systems. Pre-processing (Encoding and decoding). Sources of image degradation, atmospheric, radiometric and geometric errors, systematic and non-systematic correction and image geometry operations. Image Enhancement, image characters, histogram, scatter plots, statistics and spatial statistics for processing, image models. Spatial transforms, enhancements, radiometric and geometric operators. Fourier transforms, scale space transforms, image fusion and texture analysis. Image classification, spectral discrimination pattern, matching Baye's theorem- signature and feature extraction and training. Supervised and unsupervised methods, error matrix and accuracy estimates. Image analysis, concept of uncertainty, fuzzy partitioning, neural nets, sub-pixel classification concept, pattern recognition, feature descriptors. Remote sensing applications, Integration of Remote Sensing and GIS.

SVG 501: Aerial Triangulation **(2 Units)**

Basic concept of aerial triangulation. Analogue and digital aerial triangulation. Strip formation, strip and block adjustment. Perspective centre determination. Independent model aerial-triangulations. Multiple photo resection. Bundle adjustment of photographs. Flight Planning and procedure of aerial triangulation leading to production of map/plan.

SVG 502: Geometric Geodesy **(2 Units)**

Basic concept of geodesy. Aims and historical development of geodesy. Methods used in Geodesy and factors used for the classification in Geodesy. Representation of the figure of the earth. Coordinate systems like terrestrial and celestial coordinate systems, satellite coordinate system, inertial coordinates, curvilinear and Cartesian coordinate systems. Three-dimensional geodesy, Relative and absolute geodetic positioning. Geometry of an ellipse. Latitudes. Space-rectangular coordinates. Radii of curvature. Lengths and areas on ellipsoid. Curves on the ellipsoid. Normal Sections and Geodesics. Direct and inverse problems on sphere and ellipsoid. Geodetic datum and ellipsoid as reference surface. Data transformation from one datum to another.

SVG 503: Hydro graphic Surveying II **(2 Units)**

Sounding, wave propagation, Mathews chart and vertical beam, Echo Sounder instrumentation, operation and calibration. Acoustic waves. Ports development and management. Sweeping, side looking sonar, multibeam sonar and electronic sweeping. Elements of Oceanography, tides, currents, temperature, salinity, dredging and channelization. Pressure measurement, sedimentation and beach erosion. Modern techniques in hydro graphic, bathymetric survey in reservoirs and sediment monitoring in reservoirs using bathymetric data.

SVG 504: Satellite Geodesy **(2 Units)**

Basic concept of satellite geodesy. Geometric and dynamic techniques. Methods of observations. Satellites orbits, normal/perturbed orbits. Mathematical model, error behavior and applications of satellite techniques. Types of satellites. Very Long Baseline Interferometry (VLBI), Satellite laser ranging and satellite altimetry. Anatomy of Global Position System (GPS). Description, observations, mathematics models, error analysis, software structure and data processing in GPS. Classical and modern 3–Dimensional approaches to geodetic networks. Global coordinate system and applications of satellite to positioning and figure of the earth, gravity field determination and geodynamics.

SVG 505: Photogrammetry IV **(2 Units)**

Review of least squares application in photogrammetry. Collinearity and Coplanarity concepts and least squares methods in relative orientation. Strip, bundle and block adjustments. Systematic effects in photogrammetry. Image matching, DTM generation, digital orthophoto creation. Digital line map production, digital monoplotting. Digital photogrammetry using appropriate software. Principles and methods of photogrammetric mapping using Drone technology. Computer applications in photogrammetric projects.

SVG 506: Research Method **(2 Units)**

Review of methodologies in Surveying and Geoinformatics. Techniques in research methods. Identification of research problems, review of related literature and justification for the research. Description of data source, acquisition, quality and presentation of data, processing of data. Presentation and analysis of results, research findings, conclusions, recommendations and research contributions to knowledge. References and appendices.

SVG 507: Physical Geodesy **(2 Units)**

The earth and its gravity field. Gravitation, gravity and potential. Geoidal undulation and deflections of the vertical, geo potential numbers, orthometric, dynamic and normal heights. Size and shape of the earth, geoid as figure of the earth and other approximations. Gravity observations, absolute and relative gravity values, gravity reduction and gravity anomalies. Inverse problem in physical geodesy. Gravimetric, astro-geodetic, astro-gravimetric and satellite altimetry methods of determining the figure of the earth.

SVG 508: Project Dissertation **(4 Units)**

Identification of all types of projects of interest in Survey and Geoinformatics. Choosing, design and planning of project. Acquisition of data, quality assessment of data, documentation, and processing of data. Analysis of results and plotting of map/plan. Production of technical report on the project.

F. List of Staff

i. Surveying and Geoinformatics Staff

S/N	Name of Staff	Academic Qualifications	Status
1.	C. O. OLUWADARE	ND, B.Sc., M.Sc., Ph.D., Registered Surveyor, MNIS, MGEOSON	Senior Lecturer
2.	A. O. ABIRI	ND, B.Sc., M.Sc., Registered Surveyor, MNIS, MNAG	Lecturer I
3.	A. I. ABIDOYE	ND, B. Tech., M.Sc., Registered Surveyor, MNIS	Lecturer I
4.	K. S. ILESANMI	ND, B. Tech, M.Tech., Registered Surveyor, MNIS, MNAG	Lecturer I
5.	A. A. BABALOLA	ND, HND, PD, B.Tech, M.Sc. (Professional), Registered Surveyor, MNIS, MGEOSON	Assistant Lecturer
6.	P. T. ELUFISAN	ND, B.Tech., M.Tech.	Assistant Lecturer
7.	O. T. OLUGBOYO	ND, B.Sc.	Graduate Assistant
8.	A. O. SALIMON	ND, B.Sc.	Graduate Assistant

ii. Associate Staff from Departments within the University

S/N	Name	Rank	Qualifications	Area of Specialization	Current Department/Unit
1	B. T. Aluko	Professor	B.Sc. (Hons) M.Sc., Ph.D., ANIVS, RSV (Estate Man)	Property Investment Valuation, Real Estate Financing, Land Policy	Estate Management
2	O. A. Ogunba	Professor	B.Sc. (Hons), M.Sc., Ph.D., ANIVS, RSV (Estate Man)	Property Valuation, Development Appraisal, Environmental Valuation/ Impact Assessment	Estate Management
3	A. Olaleye	Professor	B.Sc. (Hons), M.Sc., Ph.D., ANIVS, RSV (Estate Man)	Property Portfolio diversification and management, Performance measurement, Development Financing, Real Estate Education	Estate Management
4	O. J. Adegoke	Professor	B.Sc. (Hons) M.Sc., Ph.D., ANIVS, RSV (Estate Man)	Property Valuation and Appraisal	Estate Management
5	M. O. Oyewole	Professor	B.Sc. (Hons) M.Sc., Ph.D., ANIVS, RSV (Estate Man)	Property Performance Measurement and Analysis	Estate Management
6	T. T. Oladokun	Professor	B.Sc. (Hons) M.Sc., Ph.D., ANIVS, RSV (Estate Man)	Corporate Real Estate Management	Estate Management

7	P. O. Olawuni	Professor	BSc, MSc, PhD (Ife), PGD (RECTAS)	Urban and Regional Planning	Urban and Regional Planning
8	J. A. Adedokun	Professor	B.Sc. (Hons), M.Sc., Ph.D. (London)	Atmospheric Physics	Physics
9	H. A. Soriyan	Professor	B.Sc., M.Sc., Ph.D. (Ife)	Information Systems, Software Engineering, Software Development Methodologies	Computer Science & Engineering
10	O. A. Odejobi	Professor	B.Sc., M.Sc. (Ife), Ph.D. (UK)	Computing and Intelligent Systems Engineering	Computer Science & Engineering
11	B. S. Afolabi	Professor	B.Sc. (Ife), M.Phil., Ph.D. (France)	Numerical Computation, Databases, Modelling and Simulation, Information Systems	Computer Science & Engineering
12	N. O. Adeoye	Professor	BSc, MSc (Ife), PhD (Ibadan)	Land Use Planning, Remote Sensing, GIS	Geography
13	M. O. Olawole	Professor	BSc.,(Ife), M.Sc. GIS (Ibadan), M.Sc., Ph.D. Geography (Ife)	Transport Geography, GIS Applications	Geography
14	A. Ayanlade	Professor	B.Sc. (Ife), M.Sc. RS & GIS (Ife), Ph.D. (London)	Climatology, Environmental Remote Sensing	Geography
15	A. O. Eludoyin	Professor	BSc. Ed.,(Ife), PGD (Oyo), M.Sc. Environmental Control & Mgt (Ife), Ph.D. (Exeter)	Water Resources, Remote Sensing, GIS, Environmental Studies	Geography
16	D.O. Baloye	Reader	B.Sc. (Ago-Iwoye), PGD (Oyo), M.Sc. RS & GIS (Ife), Ph.D. (Ife)	Decision Support System, Remote Sensing, GIS	Geography
17	J.O. Nwaezeigwe	Senior Lecturer	B.Sc. (Ago-Iwoye), M.Sc., Ph.D. (Ife)	Remote Sensing & GIS	Geography

iii. Other Associate Staff

S/N	Name	Rank	Qualifications	Area of Specialization	Location
1	L. Ojigi	Professor (executive Director, AFRIGIST)	B.Sc. (ABU), M.Sc (MINNA), PhD (MINNA)	Surveying and Geoinformation, Geodesy and Land Management, Digital Mapping, Remote Sensing and GIS	OAU-AFRIGIST MoU African Regional Institute for Geospatial Science and Technology (AFRIGIST, Ife)
2	D. N. Olayinka-Dosunmu	Associate Professor	ND,HND(Oyo), B.Sc., M.Sc., Ph.D (Unilag),	Surveying and Geoinformatics, Environmental Modelling	Visiting Associate
3	J. T. Fadahunsi	Senior Lecturer	B.Sc.(Nigeria), M.Sc (Ife), PhD (Ife)	Remote Sensing and GIS	Visiting Associate
4	O. A. Olunlade	Senior Lecturer	B.Sc. (Nigeria), M.Sc (Lagos), PhD (Lagos)	Geodesy	Visiting Associate
5	E. A. Adzandeh	Senior Lecturer	B.Sc. Physics (Markurdi), PGD, M.Sc., PhD (Unilag), MNIS	Remote Sensing, Flood vulnerability studies	OAU-AFRIGIST MoU AFRIGIST (Ife)
6	M. Soumah	Senior Lecturer	M. Phil (Ife), M.Sc. (Ife),	Digital Photogrammetry, Remote Sensing, GIS,	OAU-AFRIGIST MoU AFRIGIST (Ife)
7	O. Ogbebor	Associate Lecturer	LL.B(Hons) Ife, LL. M(Ife), LL.M(UK),BL	Survey and Property Law	Visiting Associate