February 2021

Geospatial Engineering

OPERATIONAL PLAN
MICHIGAN TECHNOLOGICAL UNIVERSITY
and
NORTHWESTERN MICHIGAN COLLEGE

This Operational Plan is to provide degree mapping for the implementation of the Master Agreement between Northwestern Michigan College and Michigan Technological University (Michigan Tech) relating to a Bachelor of Science degree in **GEOSPATIAL ENGINEERING** with an emphasis in **GEOINFORMATICS** and in all respects is subject to the Master Agreement.

This document outlines the courses required from both the Associates in Applied Sciences degree and Engineering Certificate program at NMC.

As such, this document outlines the courses taken at NMC and Michigan Tech as appropriate for the different curricular emphasis areas and from both the Associates in Applied Sciences degree and Engineering Certificate program at NMC.

Associate in Applied Science to Bachelor of Science in Geospatial Engineering -- Geoinformatics Emphasis

MTU / NMC Surveying Bundle	
NMC	**MTU**
SVR 110 Fundamentals of Surveying	SU 1000 Introduction to Surveying and Geoinformatics
SVR 120 CAD for Surveying	SU 2000 Introduction to Surveying
SVR 150 Construction Surveying Applications	SU 2050 Plane Surveying
SVR 160 Surveying Calculations	SU 2220 Route/Engineering Surveying
SVR 210 Survey Positioning	SU 3110 Surveying Field Practice
SVR 220 Boundary Surveying	SU 3180 Boundary Surveying Principles
WSI 200 Underwater Acoustics and Sonar	CMG 3200 Site Planning and Development
WSI 300 Remote Sensing and Sensors	SU 4010 Geospatial Concepts, Technologies, and Data
AFV 211 Commercial Drone Operations	SU 4013 Hydrographic Mapping and Surveying
	SU 3XXX Unspecified Surveying Engineering
Total Credits 35	**Total Credits 30**

Additional MTU / NMC Transfer Equivalents

NMC	Credits	MTU	Credits	NOTES
DD 170	4	ENG 1102 ENG 1XXE	3 1	
EGR 201	3	MEEM 2110	3	MEEM2110 (NMC) + MEEM2150 (MTU) = ENG2120
ENG 111	4	UN 1015 HU 1XXX	3 1	
ENG 220	3	HU2XX5	3	HASS: Comp/Comm
GEO 115	3	SS 1XXX	3	HASS: Social & Behavioral Science
MTH 121	4	MA 1030 MA 1XXX	3 1	
MTH 122	3	MA1031	3	
MTH 131	3	MA 2710	3	Will substitute in for MA3710
MTH 141	5	MA 1160 MA 1XXX	4 1	
PHL 101	3	HU 2700	3	HASS CORE: Critical/Creative Thinking
PHY 221	4	PH 2100 PH 1100	3 1	
NMC Credits	**39**	**MTU Credits**	**39**	

Courses at MTU

6th Semester (Fall) – MICHIGAN TECH			**7th Semester (Spring) – MICHIGAN TECH**		
CH 1150 CH 1151	University Chemistry I University Chemistry Lab I	3 1	MA 2320	Elem. Linear Alg.	2
ENG 1101	Engrg Analysis & Prob	3	MA 3160	Calculus III	4
UN 1025	Global Issues	3	MEEM 2150	Mechanics of Materials	3
MA 2160	Calculus II	4		Science Elective	3
GE 2000	Understanding the Earth	3	HASS CORE	Soc Resp/Ethical Reasoning	3
				Co-curricular	1
	Total	**17**		**Total**	**16**

8th Semester (Fall) – MICHIGAN TECH			9th Semester (Spring) – MICHIGAN TECH		
SU 3600	Surveying Comp. & Adjustments	4	FW 3540	Intro to GIS for Nat'l Res Mgt	4
SU 4140	Photogrammetry	3	SU 4060	Geodesy	3
FW 4540	Remote Sensing of the Env	3	IGT Elect	See flowchart for options	3
SU 4142	3D Surveying & Modeling	3		Programming Elective	3
HASS	Any HASS (3000+)	3		Co-curricular	1
		Total 16			**Total 14**

10th Semester (Fall) – MICHIGAN TECH			11th Semester (Spring) – MICHIGAN TECH		
SU 4100	Geodetic Positioning	3	SU4900	Capstone	3
SU 4300	Geospatial Monitoring	3	HU 3120	Tech & Prop Comm	3
SU 4011	Cadastre & Land Info	3	CEE 3331	Prof. Practice	2
HASS	Humanities/Fine Arts (3000+)	3	SU 4012	Geospatial Data Mining	3
	GIS Elective	3		Co-curricular	1
		Total 15			**Total 12**

MTU: 90 credits
Program Total: 74 NMC + 90 MTU = 164

General Education required courses - some selected NMC courses may satisfy MTU Gen. Ed. requirements and Michigan Transfer Agreement. See an advisor for Gen. Ed. courses and applicable MTA requirements. Thirty (30) semester credit hours of advanced level courses (3000 or higher) which apply to the degree must be completed at Michigan Tech.

Once all MTA requirements are met, the student will receive an Associate Degree from Northwestern Michigan College. Any course not completed at NMC will require completion at MTU, including all prerequisite courses. All program specific courses require a 2.0 (C) grade for transfer. Students may require additional courses necessary to meet the minimum Mathematical and English Composition prerequisites. NMC and MTU course offerings and / or delivery methods are subject to change. Students are required to meet with an academic advisor during each semester to maintain continuity with program requirements.

Engineering Certificate to Bachelor of Science in Geospatial Engineering -- Geoinformatics Emphasis

NMC	Credits	MTU	Credits	NOTES
CHM 150, 150R,150L	5	CH 1150 CH 1151 CH 1153	4 1 1	
CIT 110	3	ENG 1101	3	
EGR 101	1	ENG 1XXE	1	
EGR 113	3	ENG 1102	3	
EGR 131	5	SU 2000 SU 1000 TRU XXXX	2 1 2	
EGR 201	3	MEEM 2110	3	
EGR 202	3	MEEM 2150	3	
EGR 221	3	MSE 2100	3	
ENG 111	4	UN 1015 HU 1XXX	3 1	
ENV 111	4	GE 2000 GE 1100	3 1	
GEO 109	3	UN 1025	3	
HST 101 or HST 111 or HST 112	4	SS 2502 or SS 2500 or SS 2501 and SS1XXX	3 1	HASS: Social & Behavioral Science
MTH 141	5	MA 1160 MA 1XXX	4 1	
MTH 142	5	MA 2160 MA 1XXX	4 1	
MTH 241	5	MA 3160 MA 1XXX	4 1	
MTH 251	4	MA 2320 MA 3520	2 2	
PHL 101	3	HU 2700	3	HASS CORE: Crit/Creative Thinking
PHY 221, 221R, 221L	5	PH 2100 PH 1100 TRU XXXX	3 1 1	
PHY 222, 222R, 222L	5	PH 2200 PH 1200 TRU XXXX	3 1 1	
PSY 101	3	PSY 2000	3	HASS CORE: Social Resp/Ethical Reasoning
NMC Credits	76	MTU Credits	76	

Courses MTU

6th Semester (Fall) – MICHIGAN TECH			**7th Semester (Spring) – MICHIGAN TECH**		
MA 3710	Statistics	3	CMG 3200	Site Planning & Development	4
HASS	Any HASS Course (3000+)	3	FW 3540	Intro to GIS for Nat'l Res Mgt	4
SU 3600	Surveying Comp. & Adjustments	4	SU 4012	Geospatial Data Mining	3
SU 4142	3D Surveying & Modeling	3	SU 4010	Geospatial Concepts	3
SU 4140	Photogrammetry	3		Co-curricular	1
Total		**16**			**Total 15**

8th Semester (Fall) – MICHIGAN TECH			**9th Semester (Spring) – MICHIGAN TECH**		
FW 4540	Remote Sensing of the Env.	3	CEE 3331	Professional Practice	2
SU 4300	Geospatial Monitoring	3	SU 4013	Hydrographic Mapping	3
	Programming Elective	3		IGT Elective	3
SU 4011	Cadastre & Land Info	3	HASS	Comp/Comm (3000+)	3
	GIS Elective	3	SU 4060	Geodesy	3
				Co-curricular	1
Total		**15**			**Total 15**

10th Semester (Fall) – MICHIGAN TECH		
SU 4100	Geodetic Positioning	3
SU 4900	Capstone	3
HU 3120	Tech & Prop Comm	3
HASS	HU/FA (any level)	3
	Co-curricular	1
	Total	**13**

MTU: 71 credits
Program Total: 76 NMC + 74 MTU = 150 Credits

Master MTU – NMC

General Education required courses - some selected NMC courses may satisfy MTU Gen. Ed. requirements and Michigan Transfer Agreement. See an advisor for Gen. Ed. courses and applicable MTA requirements. Thirty (30) semester credit hours of advanced level courses (3000 or higher) which apply to the degree must be completed at Michigan Tech.

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This Operational Plan is reviewed and renewed annually unless a review is requested by administrative staff of either institution in the interim.

MICHIGAN TECHNOLOGICAL UNIVERSITY

Audra Morse

Audra Morse
Chair, Department of Civil and Environmental Engineering
2-16-21
Date

Janet Callahan

Janet Callahan
Dean, College of Engineering
2/17/21
Date

NORTHWESTERN MICHIGAN COLLEGE

Jason Slade
Director of Technical Academic Area
4/15/2021
Date

Gerald O. Dobek

Gerald Dobek
Sciences Department Head
14 April 2021
Date

Debra A Pharo

Debra Pharo
Academic Chair
4/15/21
Date

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Associate in Applied Science to Bachelor of Science in Geospatial Engineering – Professional Surveying Emphasis

MTU / NMC Surveying Bundle	
NMC	**MTU**
SVR 110 Fundamentals of Surveying	SU 1000 Introduction to Surveying and Geoinformatics
SVR 120 CAD for Surveying	SU 2000 Introduction to Surveying
SVR 150 Construction Surveying Applications	SU 2050 Plane Surveying
SVR 160 Surveying Calculations	SU 2220 Route/Engineering Surveying
SVR 210 Survey Positioning	SU 3110 Surveying Field Practice
SVR 220 Boundary Surveying	SU 3180 Boundary Surveying Principles
WSI 200 Underwater Acoustics and Sonar	CMG 3200 Site Planning and Development
WSI 300 Remote Sensing and Sensors	SU 4010 Geospatial Concepts, Technologies, and Data
AFV 211 Commercial Drone Operations	SU 4013 Hydrographic Mapping and Surveying
	SU 3XXX Unspecified Surveying Engineering
Total Credits 35	**Total Credits 30**

MTU / NMC Transfer Equivalents

NMC	Credits	MTU	Credits	NOTES
DD 170	4	ENG 1102 ENG 1XXE	3 1	
EGR 201	3	MEEM 2110	3	MEEM2110 (NMC) + MEEM2150 (MTU) = ENG2120
ENG 111	4	UN 1015 HU 1XXX	3 1	
ENG 220	3	HU2XX5	3	HASS: Comp/Comm
GEO 115	3	SS 1XXX	3	HASS: Social & Behavioral Science
MTH 121	4	MA 1030 MA 1XXX	3 1	
MTH 122	3	MA1031	3	
MTH 131	3	MA 2710	3	Will substitute in for MA3710
MTH 141	5	MA 1160 MA 1XXX	4 1	
PHL 101	3	HU 2700	3	HASS CORE: Critical/Creative Thinking
PHY 221	4	PH 2100 PH 1100	3 1	
NMC Credits	**39**	**MTU Credits**	**39**	

Courses at MTU

6th Semester (Fall) – MICHIGAN TECH			**7th Semester (Spring) – MICHIGAN TECH**		
CH 1150 CH 1151	University Chemistry I University Chemistry Lab I	3 1	MA 2320	Elem. Linear Algebra	2
ENG 1101	Engrg Analysis & Prob	3	MA 3160	Calculus III	4
UN 1025	Global Issues	3		Soc Resp/Ethical Reasoning	3
MA 2160	Calculus II	4	GE 2000	Understanding the Earth	3
	Co-curricular	1	MEEM 2150	Mechanic of Materials	3
	Total	**15**		**Total**	**15**

8th Semester (Fall) – MICHIGAN TECH			9th Semester (Spring) – MICHIGAN TECH		
SU 3600	Surveying Comp. & Adjustments	4	FW 3540	Intro to GIS for Nat'l Res Mgt	4
SU 4300	Geospatial Monitoring	3	SU 4060	Geodesy	3
SU 4140	Photogrammetry	3	SU 4180	Land Subdivision Design	3
CEE 3331	Prof. Practice	2	BUS 2200	Business Law	3
	Any HASS (3000+)	3		Science Elective	3
	Co-curricular	1		Co-curricular	1
	Total	**16**		**Total**	**17**

10th Semester (Fall) – MICHIGAN TECH		
SU 4100	Geodetic Positioning	3
HU 3120	Tech & Prop Comm	3
SU 4900	Capstone	3
	Humanities/Fine Arts (3000+)	3
	Engineering Elective	3
	Total	**15**

MTU 75 credits.
Program Total: 74 NMC + 78 MTU = 152

General Education required courses - some selected NMC courses may satisfy MTU Gen. Ed. requirements and Michigan Transfer Agreement. See an advisor for Gen. Ed. courses and applicable MTA requirements. Thirty (30) semester credit hours of advanced level courses (3000 or higher) which apply to the degree must be completed at Michigan Tech.

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Engineering Certificate to Bachelor of Science in Surveying Engineering – Professional Surveying Emphasis

NMC	Credits	MTU	Credits	NOTES
CHM 150, 150R,150L	5	CH 1150 CH 1151 CH 1153	4 1 1	
CIT 110	3	ENG 1101	3	
EGR 101	1	ENG 1XXE	1	
EGR 113	3	ENG 1102	3	
EGR 131	5	SU 2000 SU 1000 TRU XXXX	2 1 2	
EGR 201	3	MEEM 2110	3	EGR 201+ EGR 202 will cover ENG2120
EGR 202	3	MEEM 2150	3	
EGR 221	3	MSE 2100	3	Engineering Elective
ENG 111	4	UN 1015 HU 1XXX	3 1	
ENV 111	4	GE 2000 GE 1100	3 1	
GEO 109	3	UN 1025	3	
HST 101 or HST 111 or HST 112	4	SS 2502 or SS 2500 or SS 2501 and SS1XXX	3 1	HASS: Social & Behavioral Science
MTH 141	5	MA 1160 MA 1XXX	4 1	
MTH 142	5	MA 2160 MA 1XXX	4 1	
MTH 241	5	MA 3160 MA 1XXX	4 1	
MTH 251	4	MA 2320 MA 3520	2 2	
PHL 101	3	HU 2700	3	HASS CORE: Critical/Creative Thinking
PHY 221, 221R, 221L	5	PH 2100 PH 1100 TRU XXXX	3 1 1	
PHY 222, 222R, 222L	5	PH 2200 PH 1200 TRU XXXX	3 1 1	Science Elective
PSY 101	3	PSY 2000	3	HASS CORE: Social Resp/Ethical Reasoning
NMC Credits	76	MTU Credits	76	

Courses at MTU

6th Semester (Fall) – MICHIGAN TECH			7th Semester (Spring) – MICHIGAN TECH		
MA 3710	Statistics	3	CMG 3200	Site Planning & Development	4
SU 2050	Plane Surveying	4	FW 3540	Intro to GIS for Nat'l Res Mgt	4
SU 3180	Boundary Surveying Principles	4	SU 4060	Geodesy	3
SU 3110	Surveying Field Practice	4	SU 2220	Route/Engrg Surveying	3
				Co-curricular	1
		Total 15			**Total 15**

8th Semester (Fall) – MICHIGAN TECH			9th Semester (Spring) – MICHIGAN TECH		
SU 4300	Geospatial Monitoring	3	SU Elect	Surveying Elective	3
SU 3600	Surveying Comp. & Adjustments	4	BUS 2200	Business Law	3
SU 4140	Photogrammetry	3	SU 4180	Land Subdivision Design	3
CEE 3331	Professional Practice	2	HASS	Comp/Comm (3000+)	3
	Co-curricular	1		Any HASS (3000+)	3
		Total 13			**Total 15**

10th Semester (Fall) – MICHIGAN TECH		
SU 4100	Geodetic Positioning	3
SU 4900	Capstone	3
HU 3120	Tech & Professional Comm.	3
HASS	HU/FA	3
	Co-curricular	1
	Total	**13**

MTU 71 credits.
Program Total: 76 NMC + 71 MTU = 147

General Education required courses - some selected NMC courses may satisfy MTU Gen. Ed. requirements and Michigan Transfer Agreement. See an advisor for Gen. Ed. courses and applicable MTA requirements. Thirty (30) semester credit hours of advanced level courses (3000 or higher) which apply to the degree must be completed at Michigan Tech.

Master MTU – NMC

Once all MTA requirements are met, the student will receive an Associate Degree from Northwestern Michigan College. Any course not completed at NMC will require completion at MTU, including all prerequisite courses. All program specific courses require a 2.0 (C) grade for transfer. Students may require additional courses necessary to meet the minimum Mathematical and English Composition prerequisites. NMC and MTU course offerings and / or delivery methods are subject to change. Students are required to meet with an academic advisor during each semester to maintain continuity with program requirements.

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