## OCEANOGRAPHY - 5-YEAR BACHELOR OF SCIENCE AND MASTER OF OCEAN AND SCIENCE TECHNOLOGY

## **Program Requirements**

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First Year		
Fall		Semester
		Credit
OUEM 110	From domes and also of Oh amaistant I	Hours
CHEM 119	Fundamentals of Chemistry I	4
ENGL 104	Composition and Rhetoric	3
MATH 151	Engineering Mathematics I	4
OCNG 101	Succeeding in Oceanography	1
OCNG 251	The Blue Planet - Our Oceans	4
& OCNG 252	and The Blue Planet - Our Oceans Laboratory	
	Semester Credit Hours	16
Spring		
BIOL 111	Introductory Biology I	4
CHEM 120	Fundamentals of Chemistry II	4
MATH 152	Engineering Mathematics II	4
	(http://catalog.tamu.edu/undergraduate/	3
	on/university-core-curriculum/#american-	3
history)	on, university-core-curriculum, #american-	
,,	Semester Credit Hours	15
Second Year	Schiester Great Hours	
Fall		
BIOL 112	Introductory Biology II	4
OCNG 203	Communicating Oceanography	1
PHYS 206		4
& PHYS 226	Newtonian Mechanics for Engineering and Science	4
Q11113 220	and Physics of Motion Laboratory for the	
	Sciences	
STAT 211	Principles of Statistics I	3
Creative arts (http	o://catalog.tamu.edu/undergraduate/	3
	on/university-core-curriculum/#creative-	
arts)		
	Semester Credit Hours	15
Spring		
COMM 203	Public Speaking	3
or COMM 205	or Communication for Technical	
	Professions	
OCNG 330	Geological Oceanography	3
PHYS 207	Electricity and Magnetism for Engineering	4
& PHYS 227	and Science	
	and Electricity and Magnetism Laboratory	
	for the Sciences	
	(http://catalog.tamu.edu/undergraduate/	3
general-informati	on/university-core-curriculum/#american-	

Theme requireme	ent <sup>2,3</sup>	3-4
Theme requireme	Semester Credit Hours	16
Third Year Fall	Samester ordan risure	
OCNG 456 or OCNG 469	MATLAB Programming for Ocean Sciences 4 or Python for Geosciences	3
OCNG 470	Data Analysis Methods in Geosciences	4
	tical science (http://catalog.tamu.edu/	3
undergraduate/ge	eneral-information/university-core- ernment-political-science)	J
Theme requireme	nt <sup>2,3</sup>	3-4
Theme elective <sup>2,1</sup>	5	2-3
	Semester Credit Hours	16
Spring		
OCNG 303	Professional Communication in Oceanography	3
OCNG 320	Biological Oceanography	3
OCNG 340	Chemical Oceanography	3
OCNG 443	Oceanographic Field and Laboratory Methods	3
Theme elective <sup>2</sup>		3
	Semester Credit Hours	15
Fourth Year		
Fall		
OCNG 608	Physical Oceanography <sup>6</sup>	3
OCNG 655	Experimental Design and Analysis in Oceanography	3
undergraduate/ge	tical science (http://catalog.tamu.edu/ eneral-information/university-core-	3
_	ernment-political-science)	
undergraduate/ge	ioral sciences (http://catalog.tamu.edu/ eneral-information/university-core-	3
Technical elective	al-behavioral-sciences)	2
Theme elective <sup>2,1</sup>		2-3
Theme elective	Semester Credit Hours	18
Spring	Semester Cleuit nouis	10
OCNG 657	Data Methods and Graphical Representation in Oceanography	3
Select one of the	following:	3
OCNG 620	Biological Oceanography	
OCNG 630	Geological Oceanography	
OCNG 640	Chemical Oceanography	
undergraduate/ge curriculum/#lang	ophy and culture (http://catalog.tamu.edu/ eneral-information/university-core- uage-philosophy-culture)	3
Technical elective	2 1	3
Theme elective <sup>2</sup>		3
Fifth Year	Semester Credit Hours	15
Fall		
OCNG 604	Ocean Observing Systems	3

	<b>Total Semester Credit Hours</b>	150
	Semester Credit Hours	12
Advanced specia	alized OCNG graduate course	3
Advanced specia	alized OCNG graduate course	3
OCNG 661	Advanced Oceanographic Data Analysis and Communication <sup>6</sup>	3
OCNG 603	Communicating Ocean Science	3
Spring		
	Semester Credit Hours	12
Advanced specia	alized OCNG graduate course	3
Advanced specia	alized OCNG graduate course	3
	or Python for Geosciences	
OCNG 656 or OCNG 669	MATLAB Programming for Ocean Sciences 4	3
OCNG 656	MATLAB Programming for Ocean Sciences	

A grade of C or better is required.

Select one of the following tracks: Marine Ecological Processes, Marine Chemistry and Geochemistry, Ocean Climate, Ocean Observing Science and Technology

If Marine Chemistry and Geochemistry track is chosen, this will be 4 credits instead of 3 credits

Students will not be permitted to receive credit for both the 400- and 600-level versions of certain courses because the content and learning outcomes are too similar (OCNG 404/OCNG 604; OCNG 470/OCNG 655)

If Marine Chemistry & Geochemistry track is chosen, this will be 2 credits instead of 3 credits.

 $^{\rm 6}\,$  Applied toward both the Bachelor of Science in Oceanography and the Master of Ocean Science and Technology.

Select from ATMO 201, ATMO 203, ATMO 251, ATMO 300-499 (http://catalog.tamu.edu/undergraduate/course-descriptions/ atmo/); BIOL 213, BIOL 214, BIOL 300-399 (http://catalog.tamu.edu/ undergraduate/course-descriptions/biol/); BICH 300-499 (http:// catalog.tamu.edu/undergraduate/course-descriptions/bich/); CHEM 300-499 (http://catalog.tamu.edu/undergraduate/course-descriptions/ chem/); CVEN 221; GENE 300-499 (http://catalog.tamu.edu/ undergraduate/course-descriptions/gene/); GEOG 442/GEOS 442, GEOG 361, GEOG 370/MARS 370, GEOG 390; GEOS 442/GEOG 442; MATH 251; MATH 300-499 (http://catalog.tamu.edu/undergraduate/ course-descriptions/math/); PHYS 221; PHYS 300-499 (http:// catalog.tamu.edu/undergraduate/course-descriptions/phys/); OCEN 300-499 (http://catalog.tamu.edu/undergraduate/course-descriptions/ ocen/); OCNG 400-499 (http://catalog.tamu.edu/undergraduate/ course-descriptions/ocng/); STAT 212, STAT 400-499 (http:// catalog.tamu.edu/undergraduate/course-descriptions/stat/).

Any of the required courses may be taken during the Summer Sessions to diminish the heavy semester loads during Years 2 and 3.

The program includes a total of 156 hours with 6 hours being applied toward both the Bachelor of Science in Oceanography and the Master of Ocean Science and Technology.

Title

**Engineering Mathematics III** 

**Ocean Climate Theme** 

Code

**MATH 251** 

Code	Title	Semester Credit Hours
Marine Ecos	ystem Processes Theme	
BIOL 214	Genes, Ecology and Evolution	3
BIOL 357	Ecology	3
Select 12 hor	urs from the following:	12
BIOL 213	Molecular Cell Biology	

BIOL 335		
D.O. 051	Invertebrate Zoology	
BIOL 351	Fundamentals of Microbiology	
BIOL 440	Marine Biology	
BIOL 451	Bioinformatics	
CHEM 383	Chemistry of Environmental Pollution	
GEOS 410	Global Change	
	Principles of Genetics	
	Marine Pollution	
OCNG 411	Global Oceanography	
	Microbial Oceanography	
OCNG 453	Hydrothermal Vents and Mid-Ocean Ridges	
OCNG 456	MATLAB Programming for Ocean Sciences	
OCNG 469	Python for Geosciences	
OCNG 491	Research (limit to 3 credits)	
RWFM 417	Biology of Fishes	
WFSC 425	Marine Fisheries	
Total Semeste	r Credit Hours	18
Code	Title	Semester Credi
Marine Chemi	stry and Geochemistry Theme	Hours
CHEM 227	Organic Chemistry I	
& CHEM 237	and Organic Chemistry Laboratory	
CHEM 228	Organic Chemistry II	
& CHEM 238	and Organic Chemistry Laboratory	
Select 10 hour	rs from the following:	1
Select 10 hour		1
Select 10 hour ATMO 363	rs from the following: Introduction to Atmospheric	1
Select 10 hour ATMO 363 CHEM 315	rs from the following: Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative	1
Select 10 hour ATMO 363 CHEM 315 CHEM 362	rs from the following: Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis	1
Select 10 hour ATMO 363 CHEM 315 CHEM 362 CHEM 383	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental	1
Select 10 hour ATMO 363 CHEM 315 CHEM 362 CHEM 383 CHEM 415	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution	1
Select 10 hour ATMO 363 CHEM 315 CHEM 362 CHEM 383 CHEM 415 CHEM 483	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry	1
Select 10 hour ATMO 363 CHEM 315 CHEM 362 CHEM 383 CHEM 415 CHEM 483	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry	1
Select 10 hour ATMO 363 CHEM 315 CHEM 362 CHEM 483 CHEM 415 CHEM 483 GEOS 443 GEOL 451	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles	1
Select 10 hour ATMO 363  CHEM 315  CHEM 362  CHEM 383  CHEM 415  CHEM 483  GEOS 443  GEOL 451  OCNG 350	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles Introduction to Geochemistry	1
Select 10 hour ATMO 363  CHEM 315  CHEM 362  CHEM 383  CHEM 415  CHEM 483  GEOS 443  GEOL 451  OCNG 350  OCNG 411	rs from the following: Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles Introduction to Geochemistry Marine Pollution	1
Select 10 hour ATMO 363  CHEM 315  CHEM 362  CHEM 383  CHEM 415  CHEM 483  GEOS 443  GEOL 451  OCNG 350  OCNG 411	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles Introduction to Geochemistry Marine Pollution Global Oceanography Microbial Oceanography	1
Select 10 hour ATMO 363  CHEM 315  CHEM 362  CHEM 383  CHEM 415  CHEM 483  GEOS 443  GEOL 451  OCNG 350  OCNG 411  OCNG 425	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles Introduction to Geochemistry Marine Pollution Global Oceanography Microbial Oceanography Hydrothermal Vents and Mid-Ocean	10
Select 10 hour ATMO 363  CHEM 315  CHEM 362  CHEM 383  CHEM 415  CHEM 483  GEOS 443  GEOL 451  OCNG 350  OCNG 411  OCNG 425  OCNG 453  OCNG 456	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles Introduction to Geochemistry Marine Pollution Global Oceanography Microbial Oceanography Hydrothermal Vents and Mid-Ocean Ridges MATLAB Programming for Ocean	11
Select 10 hour ATMO 363  CHEM 315  CHEM 362  CHEM 383  CHEM 415  CHEM 483  GEOS 443  GEOL 451  OCNG 350  OCNG 411  OCNG 425  OCNG 453  OCNG 456	Introduction to Atmospheric Chemistry and Air Pollution Fundamentals of Quantitative Analysis Descriptive Inorganic Chemistry Chemistry of Environmental Pollution Analytical Chemistry Green Chemistry Global Biogeochemical Cycles Introduction to Geochemistry Marine Pollution Global Oceanography Microbial Oceanography Hydrothermal Vents and Mid-Ocean Ridges MATLAB Programming for Ocean Sciences Python for Geosciences	1

Semester Credit

Hours

3

MATH 308	Differential Equations	3
Select 12 hou	rs from the following:	12
ATMO 201	Weather and Climate	
ATMO 203	Weather Forecasting Laboratory	
ATMO 210	Climate Change	
ATMO 324	Physical and Regional Climatology	
ATMO 441	Satellite Meteorology and Remote Sensing	
GEOG 442/ GEOS 442	Past Climates	
MATH 304	Linear Algebra	
OCNG 411	Global Oceanography	
OCNG 451	Mathematical Modeling of Ocean Climate	
OCNG 456	MATLAB Programming for Ocean Sciences	
OCNG 469	Python for Geosciences	
OCNG 491	Research (limit to 3 credits)	
PHYS 221	Optics and Thermal Physics	
STAT 212	Principles of Statistics II	
Total Semeste	er Credit Hours	18
Total Semeste	er Credit Hours Title	Semester Credit
Code	Title	
Code	Title ing Science and Technology Theme	Semester Credit Hours
Code Ocean Observ	Title	Semester Credit
Code Ocean Observ STAT 212 OCNG 404	Title ing Science and Technology Theme Principles of Statistics II	Semester Credit Hours
Code Ocean Observ STAT 212 OCNG 404 Select 12 hour	Title ing Science and Technology Theme Principles of Statistics II Ocean Observing Systems	Semester Credit Hours 3
Code Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201	Title  ing Science and Technology Theme  Principles of Statistics II  Ocean Observing Systems rs from the following:	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201 ATMO 203	ritle  ing Science and Technology Theme  Principles of Statistics II  Ocean Observing Systems rs from the following:  Weather and Climate	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201 ATMO 203 ATMO 251	ritle  ing Science and Technology Theme  Principles of Statistics II  Ocean Observing Systems rs from the following:  Weather and Climate  Weather Forecasting Laboratory	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hour ATMO 201 ATMO 203 ATMO 251 GEOG 361	Title  ing Science and Technology Theme Principles of Statistics II Ocean Observing Systems rs from the following: Weather and Climate Weather Forecasting Laboratory Weather Observation and Analysis	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201 ATMO 203 ATMO 251 GEOG 361 OCNG 350	ritle  ing Science and Technology Theme  Principles of Statistics II  Ocean Observing Systems rs from the following:  Weather and Climate  Weather Forecasting Laboratory  Weather Observation and Analysis  Remote Sensing in Geosciences	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201 ATMO 203 ATMO 251 GEOG 361 OCNG 350 OCNG 411	ritle  ring Science and Technology Theme Principles of Statistics II Ocean Observing Systems rs from the following: Weather and Climate Weather Forecasting Laboratory Weather Observation and Analysis Remote Sensing in Geosciences Marine Pollution	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hour ATMO 201 ATMO 251 GEOG 361 OCNG 350 OCNG 411 OCNG 456	Title  ing Science and Technology Theme Principles of Statistics II Ocean Observing Systems rs from the following: Weather and Climate Weather Forecasting Laboratory Weather Observation and Analysis Remote Sensing in Geosciences Marine Pollution Global Oceanography MATLAB Programming for Ocean	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201 ATMO 203 ATMO 251 GEOG 361 OCNG 350 OCNG 411 OCNG 456 OCNG 469	ritle  ring Science and Technology Theme Principles of Statistics II Ocean Observing Systems rs from the following: Weather and Climate Weather Forecasting Laboratory Weather Observation and Analysis Remote Sensing in Geosciences Marine Pollution Global Oceanography MATLAB Programming for Ocean Sciences	Semester Credit Hours 3
Code  Ocean Observ STAT 212 OCNG 404 Select 12 hou ATMO 201 ATMO 203 ATMO 251 GEOG 361 OCNG 350 OCNG 411 OCNG 456 OCNG 469	ritle  ing Science and Technology Theme Principles of Statistics II Ocean Observing Systems rs from the following: Weather and Climate Weather Forecasting Laboratory Weather Observation and Analysis Remote Sensing in Geosciences Marine Pollution Global Oceanography MATLAB Programming for Ocean Sciences Python for Geosciences Research (limit to 3 credits)	Semester Credit Hours 3