



# A NEW UNDERGRADUATE DEGREE AT SAN JOSE STATE UNIVERSITY: BS IN METEOROLOGY, CONCENTRATION IN CLIMATE SCIENCE,

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## STANDARD METEOROLOGY MAJOR

### CHARACTERISTICS OF THE STANDARD METEOROLOGY MAJOR INCLUDE:

- **Strong emphasis math/calculus skills**
  - Three college calculus classes (minimum 10 units at SJSU)
  - Pre-calculus class for some (5 units at SJSU)
  - Differential equations class (for some; 3 units at SJSU)
- **Calculus-based physics sequence – 3 semesters (12 units at SJSU)**
- **Required Meteorology classes covering:**
  - Atmospheric Dynamics
  - Atmospheric Thermodynamics
  - Atmospheric Physics (Cloud Physics, Radiation & Radiative Transfer)
  - Synoptic Meteorology (Analysis & Forecasting)
  - Remote Sensing (Satellites & Radar)
  - Climate
  - Data Analysis (statistics)
  - Programming
  - Instruments
  - Mesoscale Meteorology
  - Etc.

## CONSTRAINTS OF METEOROLOGY DEGREE

### >Strong emphasis on short-term atmospheric state and evolution (to ~10 days)

➤ Emphasis on forecasting (in undergraduate programs).

### >No room in the curriculum for emerging areas (120 unit limit)

### >Less attention to current climate, climate change and its impacts

➤ Climate change itself (current science, uncertainties, paleoclimate studies)

➤ Impacts (food & water supply, diseases, societal impacts...)

➤ Mitigation strategies (energy and economics)

### >Math/Physics-heavy

➤ Roadblock for many students who still possess strong interest and technical ability

## THE CLIMATE SCIENCE MAJOR

### JUSTIFICATIONS FOR THE NEW MAJOR:

#### ❖ AN EMERGING NEED FOR CLIMATE-LITERATE SCIENTISTS WITH THE FOLLOWING SKILLS:

- ❖ ANALYSIS OF DATA (OBSERVATIONAL & MODEL)
- ❖ EXPERIENCE WITH MODELS (e.g. CLIMATE OR CARBON MODELS)
- ❖ THE IMPACTS OF CLIMATE CHANGE
- ❖ ENERGY AND MITIGATION STRATEGIES
- ❖ UNDERSTANDING OF BROAD CONNECTIONS TO ENERGY, WATER, AND FOOD
- ❖ PROGRAMMING AND TECHNICAL

#### ❖ PLUS A NEED TO ENSURE EMPLOYERS THAT STUDENTS HAVE EXPERIENCE SOLVING REAL CLIMATE SCIENCE PROBLEMS USING THEIR TECHNICAL SKILLS

## CLASSES IN THE NEW MAJOR

### CORE SCIENCE CLASSES

1st semester calculus (MATH 30)	1st semester college Chemistry (CHEM 1A)
Non-calculus based Physics sequence (PHYS 2A,B)	1st semester college Biology (BIOL 1A)

### DEPTH CLASSES

ADVANCED CLIMATOLOGY (METR 123)	THE GLOBAL CARBON CYCLE (METR 135)
GLOBAL CLIMATE MODELING (METR 173)	CLIMATE CHANGE SOLUTIONS (METR 174 – capstone project class)

### BREADTH CLASSES

ENERGY & ENVIRONMENT (ENVS 119)	ALTERNATIVE ENERGY STRATEGIES (ENVS 133)
COMMUNICATION & ENVIRONMENT (COMS 146F)	LIFE CYCLE ENGINEERING (ENGR 103)

### SKILLS CLASSES

STATISTICS (METR 136)	METEOROLOGICAL INSTRUMENTS (METR 163)
METEOROLOGICAL COMPUTING (METR 50/51 – FORTRAN/MATLAB)	

### ELECTIVES (3 classes from):

Water Resource Management; Food Supply & Agricultural Systems; Remote Sensing, GIS; Energy Policy Analysis; Environmental Economics & Policy; Environmental Law; Solar Energy Theory; Solar Home Design; & others

## FOUR-YEAR ROADMAP TO GRADUATION

### Four Year Roadmap - Climate Science Concentration

- For students ready to enter MATH 30 in their first semester at SJSU, this roadmap is a path to graduation in four years, assuming classes are taken exactly in the order and semester shown. Other students may need to take pre-calculus math, and/or summer school, and/or extra semesters to graduate.

- Please note that ALL METR classes (except METR 10) are given ONLY in the semester indicated below (e.g., METR 71 is given only in SPRING).

#### Suggested Course Schedule for Students entering Fall 11

Freshman			
Fall	Units	Spring	Units
Metr 12 (Global Warming: Science & Solutions)	3	Phys 2B (Fundamentals of Physics)	4
Phys 2A (Fundamentals of Physics)	4	Math 30 (Calculus I)	3
Sci 2 (Success in Science, GE #1)	3	Metr 40 (Weather Seminar) **	1
Math 19 (Pre-Calculus)	5	ENVS 1 (GE #2)	3
		GE #4 and #5	6
<b>TOTAL UNITS</b>	<b>15</b>		<b>17</b>
		<b>(16 units count towards major)</b>	<b>26</b>
Sophomore			
Fall	Units	Spring	Units
Metr 50 (Computing - Fortran)	2	Metr 51 (Computing - C++/Matlab)	2
Metr 60 (Intro to Meteorology) <sup>2</sup>	3	Metr 71 (Intro to Climate Science)	2
Chem 1A (General Chemistry)	5	Biol 001A (Foundations in Biodiversity)	5
Geol 3 (Planet Earth)	3	GE #6 and #7	6
GE #5	3	Kin	1
Kin	1		
<b>TOTAL UNITS</b>	<b>17</b>		<b>16</b>
			<b>59</b>
Junior			
Fall	Units	Spring	Units
Metr 100W (Writing Workshop)	3	Metr 163 (Meteorological Instrumentation)	3
Metr 135 (The Global Carbon Cycle)	3	Engr 103 (Life Cycle Engineering)	3
Metr 136 (Empirical Techniques in Meteorology)	3	Envs 119 (Energy and the Environment)	3
GE #8 and #9	6	Elective 1	3
		GE #10	3
<b>TOTAL UNITS</b>	<b>15</b>		<b>15</b>
			<b>89</b>
Senior			
Fall	Units	Spring	Units
Metr 123 (Advanced Climatology)	3	Metr 174 (Climate Change Solutions)	3
Metr 173 (Global Climate Modeling)	3	Envs 133 (Alternative Energy Strategies)	3
Comm 146F (Communication & the Environment)	4	Elective 3	3
Elective 2	3	ADV GE #2 and #3	6
ADV GE #1	3		
<b>TOTAL UNITS</b>	<b>16</b>		<b>15</b>
		<b>Total Units for Major</b>	<b>120</b>

<sup>1</sup> Math 19 does not count towards BS degree, but is a prerequisite for Math 30

<sup>2</sup> Recommended but not required

#### ELECTIVES (take 3 classes in consultation with advisor)

ENVS 107	Env Econ & Policy	GEOG 120	Food Supply & Ag. Systems
ENVS 116	Solar Energy Theory	GEOG 124	Topics in Physical Geography
ENVS 124	Env. Law	GEOG 130	Natural Resources
ENVS 128	Water Resource Management	GEOG 170	Mapping & GIS
ENVS 130	Energy Policy Analysis	GEOG 171	Mapping & GIS Analysis
ENVS 132	Solar Home Design	GEOG 181	Remote Sensing
		GEOG 182	Remote Sensing/digital

## CONCLUSIONS

- Early student interest has been very positive.
- Most new classes have been successfully taught in the past two years.
- No graduates yet!
- Challenges remain in hiring additional faculty to support the new degree.
- Next step: make this a new stand-alone major.