

## SEE8223 Tropical Meteorology and Climate

<b>Course Title:</b>	Tropical Meteorology and Climate
<b>Course Code:</b>	SEE8223
<b>Course Duration:</b>	One semester
<b>Credit Units:</b>	3
<b>Level:</b>	R8
<b>Medium of Instruction:</b>	English
<b>Prerequisites:</b>	N/A
<b>Precursors:</b>	N/A
<b>Equivalent Courses:</b>	SEE4201 or SEE5201 Students should also have knowledge in ordinary and partial differential equations
<b>Exclusive Courses:</b>	N/A

### Course Aims

*The course is designed for research postgraduate students. The course will provide students with in-depth knowledge of the processes occurring in the tropical atmosphere, and enable them to apply such knowledge in discovering and explaining the dynamics of various tropical weather systems as well as the observed and projected changes in tropical climate.*

### Course Intended Learning Outcomes (CILOs)

*(state what the student is expected to be able to do at the end of the course according to a given standard of performance)*

Upon successful completion of this course, students should be able to:

No	CILOs	Weighting (if applicable)
1	Describe the circulation and radiative processes of the tropical atmosphere	2
2	Explain the physics of the tropical boundary layer	1
3	Describe the thermodynamic and dynamic processes of the tropical atmosphere	3
4	Describe the dynamics of various weather systems in the tropics	3
5	Describe the different climate phenomena in the tropics	2

### 3. Teaching and Learning Activities (TLAs)

*(designed to facilitate students' achievement of the CILOs)*

TLAs	Lectures	Group Discussion/Tutorial	Total (hrs)
CILO 1	5	1	6
CILO 2	2	1	3
CILO 3	10	2	12

CILO 4	10	2	12
CILO 5	5	1	6
Total (hrs)	32	7	39

Suggested lecture/tutorial/laboratory mix: For each topic within each CILO, discussion sessions/tutorials will be held after the lectures of that topic have been delivered. Discussions of the assignments and the mid-term quiz will also be made after grading.

#### 4. Assessment Tasks/Activities

*(designed to assess how well the students achieve the CILOs)*

*Percentage of coursework, examination, etc.:* 100% by coursework

Coursework consists of assignments and a term paper. Assignments will take the form of reviewing seminal papers on each of the CILOs except CILO2. One assignment will be set for CILO2 for assessment. Term paper is a major part of the course and each student is required to review a set of papers with a theme chosen by the student from any of the areas taught in the course to discover the most salient points related to a particular topic.

ATs	Assignment (%)	Term Paper (%)	Total (%)
CILO 1	9	15	24
CILO 2	4	-	4
CILO 3	9	15	24
CILO 4	9	15	24
CILO 5	9	15	24
Total	40	60	100

#### 5. Grading of Student Achievement: Refer to Grading of Courses in the Academic Regulations (Attachment) and to the Explanatory Notes.

The grading is assigned based on students' performance in assessment tasks/activities.

### Part III

#### Keyword Syllabus:

- Circulation of the tropical atmosphere  
Zonally symmetric and asymmetric circulations, vertical structure of the tropical atmosphere
- Radiative processes in the tropics  
Radiative climatology of the tropics, heat balance
- Tropical boundary layer  
Ekman pumping, flux exchanges with the ocean surface layer
- Tropical convection  
Basic concepts, heat budget, cumulus parameterization theories
- Tropical dynamics  
Tropical waves, instabilities

- Land-sea breeze and diurnal variations  
Land-sea breeze dynamics, diurnal variations, topographic forcing
- Tropical weather systems  
Monsoons, easterly waves, tropical cyclones
- Climate phenomena in the tropics  
Atmospheric and oceanic oscillations on various time scales, climate variability of tropical weather systems and their relationship with different oscillations

**Recommended Reading:**

- *Introduction to Circulating Atmospheres*, I. N. James (Cambridge 1994)
- *Atmospheric Convection*, K. A. Emanuel (Oxford, 1994)
- *El Niño, La Niña and the Southern Oscillation*, S. G. Philander (Academic Press, 1990)
- *Monsoons over China*, Y. Ding (Kluwer Academic Publishers, 1994)
- *Global Perspectives on Tropical Cyclones: From Science to Mitigation*, [J. C. L. Chan and J. Kepert (eds.)]. (World Scientific Publishing Company, 2010)
- Various journal articles to be provided