

# ATM323 Advanced Course in Radar Meteorology

HUOM! OPINTOJAKSOJEN TIETOJEN TÄYTTÄMISTÄ KOORDINOIVAT KOULUTUSSUUNNITTELIJAT HANNA-MARI PEURALA JA TIINA HASARI

- 1. Course title
- 2. Course code
- 3. Course status: compulsory/optional
- 4. Course level (first-, second-, third-cycle/EQF levels 6, 7 and 8)
- 5. Recommended time/stage of studies for completion
- 6. Term/teaching period when the course will be offered
- 7. Scope of the course in credits
- 8. Teacher coordinating the course
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## 1. Course title

Tutkameteorologian jatkokurssi  
Fortsättningskurs i radarmeteorologi  
Advanced Course in Radar Meteorology

## 2. Course code

ATM323

Aikaisemmat leikkaavat opintojaksot 53665 Tutkameteorologian jatkokurssi, 5 op

## 3. Course status: compulsory/optional

-Which degree programme is responsible for the course?  
Master's Programme in Atmospheric Sciences

-Which module does the course belong to?  
ATM300 Advanced Studies in Atmospheric Sciences  
compulsory for

- Study Track in Meteorology (if students chooses Meteorologinen kaukokartoitus -course package)

optional for

- Study Track in Aerosol Physics
- Study Track in Remote Sensing

-Is the course available to students from other degree programmes?  
Yes

## 4. Course level (first-, second-, third-cycle/EQF levels 6, 7 and 8)

Master's level, degree programmes in medicine, dentistry and veterinary medicine = secondcycle degree/EQF level 7  
Doctoral level = third-cycle (doctoral) degree/EQF level 8

-Does the course belong to basic, intermediate or advanced studies (cf. Government Decree on University Degrees)?  
Advanced studies

## 5. Recommended time/stage of studies for completion

-The recommended time for completion may be, e.g., after certain relevant courses have been completed.

Should be taken at the later stages of studies

## 6. Term/teaching period when the course will be offered

The course will be lectured every other year (even years) in the III period.

## 7. Scope of the course in credits

5 cr

## 8. Teacher coordinating the course

Dmitri Moisseev

## 9. Course learning outcomes

-Description of the learning outcomes provided to students by the course  
- See the competence map (<https://flamma.helsinki.fi/content/res/pri/HY350274>).

- You will learn how modern weather radars work
- You will be provided a solid conceptual and mathematical foundation needed to interpret radar measurements
- You will understand radar observation limitations, i.e. "Doppler dilemma", and how these are mitigated
- You will be able to convert radar observations to meteorological products, like precipitation rate
- You will learn how dual-polarization radar observations can be used for hydrometeor classification, attenuation correction and better rainfall estimation
- On the example of Finnish Meteorological Institute weather radar network, topics related to data quality control will also be discussed

## 10. Course completion methods

-Will the course be offered in the form of contact teaching, or can it be taken as a distance learning course?

-Description of attendance requirements (e.g., X% attendance during the entire course or during parts of it)

-Methods of completion

- Exercises and final exam

## 11. Prerequisites

-Description of the courses or modules that must be completed before taking this course or what other prior learning is required

The following courses should be completed before taking the course

- [ATM357 Atmospheric Radiation](#)
- [ATM354 Cloud Physics](#)

It is also recommended that you complete this course:

- [ATM322 Meteorological observation systems](#)

## 12. Recommended optional studies

-What other courses are recommended to be taken in addition to this course?

-Which other courses support the further development of the competence provided by this course?

For the hands-on application of the learned material attend:

- [ATM324 Laboratory Course in Radar Meteorology](#)

To get a better understanding on how radars are used to study cloud and precipitation processes

- [ATM361 Field course in remote sensing of the atmosphere](#)

### 13. Course content

- Introduction to weather radar
- Types of weather radar measurements
- Review of EM waves and their propagation through atmosphere
- Radar hardware
- Radar equation for point and volume targets
- Radar signal processing, Doppler measurements
- Converting radar observations to other meteorological quantities
- Dual polarization radar observations and the basis for interpretation for various types of storm observations
- Detailed study of rainfall, QPE and hydrometeor classification with dual-polarization radars

### 14. Recommended and required literature

-What kind of literature and other materials are read during the course (reading list)?  
-Which works are set reading and which are recommended as supplementary reading?

- Lecture notes
- V. Bringi and V. Chandrasekar, 2001: Polarimetric Doppler Weather Radar: Principles and Applications
- R. Doviak and D. Zmic, 1993: Doppler Radar and Weather Observations

### 15. Activities and teaching methods in support of learning

-See the competence map (<https://flamma.helsinki.fi/content/res/pri/HY350274>).  
-Student activities  
-Description of how the teacher's activities are documented

- Weekly lectures and exercises (individual work). Total hours 135.

### 16. Assessment practices and criteria, grading scale

-See the competence map (<https://flamma.helsinki.fi/content/res/pri/HY350274>).  
-The assessment practices used are directly linked to the learning outcomes and teaching methods of the course.

- Final grade is based on exercises (30%) and final exam (70%).

### 17. Teaching language

English