

# Syllabus for GEOS 695 - SAR and InSAR: Principles and Applications

## 1. Course information:

Title: SAR and InSAR: Principles and Applications  
Number: GEOS 695  
Credits: 1 (for each week)  
Prerequisites: GEOS 422 or an equivalent basic remote sensing course; or permission of instructor  
Location: Lectures – Elvey Building (Room TBD)  
Labs – WRRB: Remote sensing lab  
Meeting time: TBD

## 2. Instructors:

Rudiger Gens, 511 M Elvey Building, Tel. 474 7421; email: [rgens@asf.alaska.edu](mailto:rgens@asf.alaska.edu)

## 3. Course readings/materials:

No course textbook

Recommended supplementary readings:

Henderson, F.M. and Lewis, A.J., 1998, *Manual of Remote Sensing, Volume 2, Principles and Applications of Imaging Radar*. Wiley:New York, 896 p.

Ghiglia, D.C. and Pritt, M.D., 1998, *Two-dimensional phase unwrapping: Theory, algorithms and software*. Wiley:New York, 483 p.

## 4. Course description:

This two week course will have the first week dedicated to SAR and the second week dedicated to InSAR. The SAR portion of the course will include the basic principles of SAR, SAR satellites, acquisition of SAR data, principles of interpretation of SAR imagery, and application of SAR data especially for monitoring snow and ice features in the Arctic. Students will gain hands on experience on ordering, processing, and interpreting SAR data, and will have an opportunity to present and discuss the issues, advantages and limitations of using SAR data for their specific research/application. The InSAR component (week two) will include the principles of InSAR and differential InSAR, a detailed step-by-step understanding (theory and practical) on the processing chain including procedures for generation of a Digital Elevation Model (DEM), and will conclude with several case studies on InSAR applications.

## 5. Course Goals and Student Learning Outcomes

Goal: The goal of this course is to provide knowledge of the fundamentals and applications of SAR and InSAR and to provide hands-on experience in using SAR – InSAR data and software tools

Student Learning Outcomes: By the end of the course, students should be able to

- *Know* about operational SAR satellites, SAR sensors, and fundamentals of SAR and InSAR data acquisition, processing, and interpretation.
- *Order* SAR data using the EOS data gateway

- *Geocode* SAR data using ASF software tools
- *Generate* a Digital Elevation Model using ASF software tools and the SAR data available
- *Use* the ASF Radarsat baseline catalog and determine what datasets would best meet their InSAR processing needs
- *Process* data sets of their own research application and area of interest
- *Appreciate* the variety of applications that SAR and InSAR are being used for
- *Discuss* the advantages and practical limitations of SAR and InSAR

## **6. Instructional methods:**

The instructional methods used in this course will be

- 25 hours of lectures
- 45 hours of supervised training in the computer lab
- group discussion based on course material and additional reading assignment

## **7. Course calendar:**

Schedule: TBD

## **8. Course policies:**

Attendance in lectures and labs is essential. For some reason, if the course participant can not be present for a lecture or lab, they should inform the instructor in advance and make arrangements for make up of the time.

## **9. Evaluation:**

The course is a pass/fail course. Regular attendance, class participation, and completion of lab assignment will result in a "pass".

## **10. Support Services:**

The course participants may be local Fairbanks residents or outstation participants. The instructor will be in touch with students/potential students ahead of time. Based on the number of anticipated outstation students, a block of rooms will be reserved with the summer housing at the UAF.

## **11. Disabilities Services:**

The instructor will work with the Office of Disabilities Services to provide reasonable accommodation to students with disabilities.