

**Thematic Course**  
**PhD in "Scienze Economiche e Statistiche"**  
**SEAS Department**  
**University of Palermo**

Academic Year	2021-2022
Subject	Complex space-time point processes
Instructor	Giada Adelfio
Course description	<p>Point processes are well studied objects in probability theory and a powerful tool in statistics for modelling and analyzing the distribution of real complex phenomena. Point processes can be introduced considering the joint distributions of the counts of points in arbitrary sets or defining a complete intensity function, that is a function of the points history that generalizes the rate function of a Poisson process. In this course the definitions, together with some techniques to estimate the intensity function of space-time point processes are introduced.</p> <p>To assess the goodness of fit diagnostic methods are also provided.</p> <p>Students are expected to learn about the main features of PP, in particular they should learn the specific language of PP theory and their fundamentals, with advanced hints for future studies.</p>
Learning Objectives	<p>Students should become able to apply their knowledge and comprehension to tackle problems of uncertainty by means of suitable PP models.</p> <p>Specifically, students should be able to:</p> <ul style="list-style-type: none"> <li>-classify a PP process;</li> <li>-interpret different forms of stochastic dependencies;</li> <li>-describe a time and space dependent random pattern with a suitable PP process;</li> <li>-apply insights from the theory of PP for a better comprehension of real world problems.</li> </ul>
Suggested readings	<p>An Introduction to the Theory of Point Processes, Daley Vere-Jones</p> <p>Space-Time Point-Process Models for Earthquake Occurrences, Ogata</p> <p>Papers in a dedicated shared folder</p>
Course Activity (hrs)	10h
Credits	3
Assessment Method	A written report on a scientific paper
Teaching Methods	Each section utilizes a combination of lecturing, computer lab and class discussion.
Calendar	April/May 2022
Contacts	giada.adelfio@unipa.it

## Calendar of Classes

Lecture	Date	Topic	Duration
1	TBA	Introduction to space-time PP and some basic definitions	2h
2	TBA	Second order charecteristics	2h
3	TBA	Definition of specific PP	2h
4	TBA	Estimation and Diagnostics methods for PP	2h
5	TBA	Real data analysis	2h