

# PDE Gluing Constructions in Differential Geometry

**Time** 13:30-15:00, April 27, 29, May 4, and 6, 2026

**Venue** Room 509, Cosmology Building, NTU



**Speaker**

**Nikolaos Kapouleas**  
Brown University

**Organizer**

**Yng-Ing Lee**  
National Taiwan University & NCTS

## Introduction & Purposes

Gluing and desingularization are important and powerful techniques in geometric analysis. These methods have been widely used to resolve difficult problems and to reveal new geometric phenomena. The general strategy involves identifying suitable local models, gluing them to initial geometric objects to construct approximate solutions with controlled properties, and then applying PDE techniques to solve highly nonlinear equations and obtain genuine solutions.

Professor Nikolaos Kapouleas is a world famous leading expert in this direction. These techniques have played a central role in many developments in differential geometry. In particular, they have been used in the study of constant mean curvature (CMC) surfaces, minimal surfaces, special Lagrangian, self-shrinkers, free boundary minimal surfaces, certain geometric manifolds such as Eguchi–Hanson spaces, etc.

This course will introduce some of the main ideas and constructions in these gluing methods and explore how they are applied in geometric analysis.



Contact

**Murphy Yu**  
murphyyu@ncts.tw

## Outline & Descriptions

In the first part of the course, Prof. Kapouleas will review various constructions in Differential Geometry by PDE gluing methods, including constructions of CMC (hyper)surfaces, desingularization and doubling constructions for minimal (hyper)surfaces, and the determination of the index and nullity of some minimal surfaces.

In the second part Prof. Kapouleas will discuss in some detail the gluing methodology emphasizing important ideas in the constructions presented in the first part. These lectures will be designed to be accessible to graduate students.