

# INTENSIVE LECTURE SERIES in Mathematics, Keio



**Speaker: Prof. Jurgen Berndt**  
(University College Cork, Ireland)

**Date: July 3 - 5, 2006**

**Time: 16:30 - 18:00**

**Place: Koiseto, 16-A Building,  
Yagami Campus, Keio University**

## Title: Submanifolds in Riemannian geometry

I plan to give an introduction to submanifold theory in the context of Riemannian geometry and to present some selected recent developments regarding submanifolds of symmetric spaces.

The theory of submanifolds in Riemannian geometry is a natural generalization of the classical theory of surfaces in three-dimensional Euclidean space. The aim of submanifold geometry is to understand geometric invariants of submanifolds and to classify submanifolds according to given geometric data. In Riemannian geometry, the structure of a submanifold is encoded in the second fundamental form and its geometry is controlled by the equations of Gauss, Codazzi and Ricci. These are the basic ingredients of submanifold geometry and will be discussed thoroughly in the first lecture.

Of particular importance in Riemannian geometry are symmetric spaces. The theory of symmetric spaces was developed by Elie Cartan and is closely related to the theory of semisimple Lie groups. In the second and third lecture I plan to give an introduction to symmetric spaces and to discuss some solved and open problems about submanifolds in symmetric spaces.

### Prerequisites:

Basic knowledge of Riemannian geometry including Riemannian manifolds, isometries, covariant derivatives, geodesics, Riemannian curvature tensor, sectional curvature, vector fields, distributions.

### Literature:

Jurgen Berndt, Sergio Console, Carlos Olmos: Submanifolds and holonomy.  
Chapman & Hall/CRC Research Notes in Mathematics 434, Chapman & Hall/CRC,  
Boca Raton, FL, 2003, x+336 pp. ISBN: 1-58488-371-5