Have a look at the following links:

1. Orthogonal complement
2. Orthogonal decomposition

The key points are

- If we look at an n-dimensional vector space V and a k-dimensional subspace $W \subset V$, then the orthogonal complement $W^{\perp}$ is an $(n-k)$-dimensional subspace of V and contains all vectors in V that are orthogonal to every vector in W.
- Every vector $\mathbf{x} \in V$ can be (uniquely) decomposed into $\mathbf{x} = \sum_{i=1}^{k} \lambda_i \mathbf{b}_i + \sum_{j=1}^{n-k} \psi_j \mathbf{b}_j^{\perp}, \lambda_i, \psi_j \in \mathrm{R}$, where $\mathbf{b}_1, \ldots, \mathbf{b}_k$ is a basis of W and $\mathbf{b}_1^{\perp}, \ldots, \mathbf{b}_{n-k}^{\perp}$ is a basis of $W^{\perp}$.