The first step in the theory of inverse problems for differential operators

$$L = -\frac{d2}{dx2} + q(x), \qquad 0 \leq x \leq 1,$$

was made by V. Ambartsumyan. In his pioneering paper of 1929 in Zeitschrift fur Physik he proved that if $q(x) \in L2(0,1)$ is a real-valued function and the spectrum of the boundary problem

$$Ly(x) = \lambda y(x), \qquad y'(0) = y'(1) = 0,$$

coincides with the set $\sigma = \{n2\}_{n=0}^{\infty}$, then $q(x) \equiv 0$.

Another example of a boundary problem for operator L whose spectrum determines uniquely the potential $q(x)$ is given by the periodic boundary conditions

$$y(1) - y(0) = y'(1) - y'(0) = 0.$$

Namely, if this spectrum is the same set σ, then again $q(x) \equiv 0$.

The talk will be devoted to the similar results for self-adjoint differential operators of the fourth order

$$L = \frac{d4}{dx4} + \frac{d}{dx}p(x)\frac{d}{dx} + q(x), \qquad 0 \leq x \leq 1.$$