Integrable Systems: Twistors, Loop Groups, and Riemann Surfaces (Oxford Graduate Texts in Mathematics, Vol. 4)

By N. J. Hitchin, G. B. Segal, R. S. Ward

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This textbook for graduate students introduces integrable systems through the study of Riemann surfaces, loop groups, and twistors. The introduction by Nigel Hitchin addresses the meaning of integrability, discussing in particular how to recognize an integrable system. He then develops connections between integrable systems and algebraic geometry and introduces Riemann surfaces, sheaves, and line bundles. In the next part, Graeme Segal takes the Korteweg-de Vries and nonlinear Schrödinger equations as central examples and discusses the mathematical structures underlying the inverse scattering transform. He also explains loop groups, the Grassmannian, and algebraic curves. In the final part of the book, Richard Ward explores the connection between integrability and self-dual Yang-Mills equations and then describes the correspondence between solutions to integrable equations and holomorphic vector bundles over twistor space.

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About the Author
N. J. Hitchin is at University of Oxford. G. B. Segal is at University of Cambridge.

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