

Sant'Anna School of University Studies and Doctoral Research

S.S.D. ING/INF03 Telecommunications (3 credits)

The Migration Toward the Optical Internet

Spring 2003

**Instructor:**

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appointment upon request

**Textbook:**

Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks, A Practical Perspective”, Morgan Kaufmann Publishers (second edition), 2002

ISBN 1-55860-655-6

**Other suggested books:**

Bertsekas D. and Gallager R., “Data Networks”, Prentice Hall (second edition), 2001

ISBN 0-13-200916-1

W. Richard Stevens, “TCP/IP Illustrated, Volume 1: The Protocols”, Addison-Wesley (second edition), 2001

ISBN 0-201-63346-9

Robert J. Vanderbei, “Linear Programming, Foundations and Extensions”, Kluwer Academic Publishers (second edition), 2001

ISBN 0-7923-7342-1

David G. Luenberger, “Linear and Nonlinear Programming”, Addison-Wesley (second edition), 1984

ISBN 0-201-15794-2

Michel Gondran and Michel Minoux, “Graphs and algorithms”, Wiley-Interscience, 1984

0-471-10374-8

Biswanath Mukherjee, “Optical Communication Networks”, McGraw Hill, 1997

ISBN 0-07-044435-8

T.-H. Wu, “Fiber Network Service Survivability”, Artech House Inc., 1992

ISBN 0-89006-469-5

**Course objective:**

This course focuses on the most recently proposed architectures for high speed communication networks. Particular attention is dedicated to the IP over WDM architecture. The course will 1) introduce the basic concepts of the Internet Protocols (IP) and of the Optical Layer (OL), 2) give an overview of the proposed standards for the IP over WDM architecture (POS, ASON, GMPLS), 3) describe the challenges in the design of IP over WDM architecture, 4) investigate the problem of resilience in IP over WDM network architectures.

**Concepts/tools to be acquired in this course:**

- Basic concepts and terminology for the Internet Protocol and Optical Networks
- The Internet architecture and protocols (TCP, IP, OSPF, RSVP)
- The Optical Layer architecture and devices
- The IP over WDM concept
- The standard bodies (OIF, ITU, IETF)
- The proposed standards for the IP over WDM architecture
- Tools for network design (Integer Linear Programming, Simulated Annealing)
- Resilience in the IP over WDM architecture
- Resilience schemes in the WDM layer
- Experimental application of the concepts learned

**Prerequisites:**

Basic knowledge of graph theory, communication network protocols, and programming.

**Project/Exam:**

Student will be required to pass a written exam schedule at the end of the course. In addition a written report of the activities performed in the laboratory (one third of the course) will have to be presented at the end of the course.

**Grading policy:** Final grade will be determined by the weighted average of the written exam and laboratory report.