A Needs Assessment Report of A Graduate Level Course in Optical Networking

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Abstract: To explore the need of a graduate level course in Optical Networking for engineering students, a nationwide needs assessment was conducted in March 2003. The results support the need of such a course. Recommendations were made on instructional materials, course contents and delivery method based on the data collected.

Optical Networking is seen as an emerging technology that can fulfill the increasing demand for large communication network bandwidth. With the potential of effectively utilizing the existing network infrastructure, Optical Networking has caught a great deal of attention of both industry and research institutes nationwide.

A needs assessment was conducted in March 2003 to gain the general perception of offering a graduate level course for electrical engineering (EE) students. An online survey, which employed a four-point Likert type rating scale with strongly agree equal to 3 and strongly disagree equal to 0, was designed and distributed to the nationwide electrical engineering community to collect data regarding the need of the course, the optimal contents, delivery method and teaching materials. In addition, extant Optical Networking course syllabi and descriptions were obtained from 14 reputable EE schools in the United States and were examined in terms of instructional contents, materials, and strategies.

The survey results show a supportive attitude towards offering an Optical Networking course in engineering graduate curriculum. Among the total 61 responses received nationwide (faculty members N = 20, graduate students N = 35, engineering professionals N = 6), 84% respondents agreed or strongly agreed with the addition of the course (M = 2.47). There was no strong disagreement reported.

The focus of the course “Understanding of basic mechanism in Optical Networking” was ranked the highest (M = 2.59), followed by “Understanding of Current Trends in Optical Networking” as the second highest (M = 2.45). The lowest ranked course focus area was Designing and Evaluation Protocols for Optical Networks (M = 2.21).

The topic of General Principles was ranked as the most important content to cover in the Optical Networking course (M = 2.55). To be specific, WDM/ DWDM was ranked the top, followed by layered/hierarchical network architecture and 1st to 3rd generation of optical systems. In terms of prerequisite knowledge that students should possess before taking the Optical Networking course, the online survey respondents rated Networking Basics (TCP/IP) as the most important (M = 2.41).

According to the syllabi and course descriptions, all 14 extant Optical Networking courses used textbooks. Optical Networks- A Practical Perspective, Fiber Optic Communication Systems, and Optical Communication Networks were most widely used textbooks. Textbook is also the highest rated instructional material in the online survey (M = 2.63). Instructor Slides were ranked as the second preferred (M = 2.53), and Database of Test Questions as the least preferred (M = 1.86).

Interestingly, the Entirely-Online delivery method, which is generally considered ‘technological’, was ranked as the least favorable (M = 0.57) by the engineering community, whereas Entirely Face-to-Face was the most preferred (M = 2.38). The hybrid form of course delivery (Emphasize Face-to-Face Classroom Activities with Online Readings and Assignments) was ranked the second high (M = 2.33). It is recommended that the course is delivered either exclusively face-to-face or in a hybrid form which emphasizes face-to-face classroom activities but combines those with online readings and assignments.