Design of an all optical wavelength converter based on optical fiber nonlinearities

Note: points with (*) must be done, while others are optional according to time and student's activities)
ILOS: intended learning outcomes.

1-Theoretical and historical ILOS

a- Brief history on optical communication systems and development.*
b- Basics of optical fiber communication: Ray theory, Electromagnetic mode theory, fiber types and some of transmission characteristics of optical fibers.*
c- Studying some of optical fiber nonlinearities (Raman-FWM-SPM….) and an introduction to solitons*.
d- Study of different types of optical fiber amplifiers (EDFA-TDFA-SOA).

2-Mathematical modeling & simulation ILOS

a- Evaluating the pulse broadening in a SMF-28 using SPM nonlinearity.*
b- Evaluating the pulse broadening in a SMF-28 using FWM nonlinearity.*
c- Using pervious data to design the system suitable for all optical wavelength converter for SPM & FWM using optisystem 7.0.*
d- Estimation the effect of SMF-28 length and the gain of the system's amplifier.*
e- Studying the drawbacks of SMF-28 and investigate more practical fibers.
f- Repeating (a-e) to get the optimum performance.

3-Practical and design ILOS

a- Establishing high speed fiber optic network between PCs, including network adjustment and protocols.*
b- Establishing Audio optical fiber communication system.*
c- Optical fiber Sensors.

4- Student's specifications

a- Ability to read and search. (most important)***
b- Very good practical experience.*
c- Very good programming experience (Matlab-Mathcad-Maple)*
d- Working in a group***.

5-Advanced ILOS

a- Using Optsim or OptiSystem software packages to plan, test, and simulate the following:

(WDM/TDM network design, Transmitter, channel, amplifier, and receiver design, Dispersion map design, Estimation of BER and system penalties with different receiver models)