Bandwidth and power efficiency for PPM schemes for free space optical communication

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

1-Theoretical and historical ILOS

a- Brief history on free space optical communication systems and development.*
b- Basics of free space optical communication: Ray theory, systems configurations, history of FSO channel modeling, historic and basic transmitter types, basic receiver design & Eye –skin safety for FSO networks. *
c- IEEE 8011.b and IrDA standardizations for FSO.*
d- Review of market indoor and outdoor FSO-WOC systems*.

2-Mathematical modeling & simulation ILOS

a- Evaluating bandwidth and power efficiency for FSO standard PPM modulation schemes (PPM-MPPM-L-OPPM).*
b- Evaluating bandwidth and power efficiency for DAPPM.*
c- Comparison between modulation codes and schemes and link with IEEE 802.11-b and IrDA to give a goal for our study.*
d- Evaluating bit error rate performance for famous PPM schemes.
e- Repeat (a- d) for new advanced modulation schemes for FSO like (DPPM-TCPPM-TCMPPM)

3-Practical and design ILOS

a- Audio optical system (transmitting voice using a laser carrier).*
b- Short range infrared remote control.*
c- Optical door counter.
d- Laser spy.

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 cadence 16.3 electro-optic libraries to design, test and make ready to implement parts of different types of FSO transmitter-receiver designs that uses electro-optical interface.