Course Syllabus

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Class time: M5M6R6   Location: Delta 202

Course Description:

This course provides discussions and lectures so that the students may develop deeper understandings toward recent advancements in the field of ultrafast optics. This is an advanced course, aiming for graduate students with strong determination into the world of ultrafast optics in general and most likely with on-hand experience already. I thus anticipate in having frequent questions and discussions within the lectures. To further encourage nice atmosphere for an open forum, students taking this course will be asked to survey among top journal articles, express their opinions and join open discussions.

Prior knowledge in ultrafast optics and Matlab are beneficial but not required.

Class notes: http://lms.nthu.edu.tw

References:

A. M. Weiner, *Ultrafast Optics*, (Wiley, 2009). **(NTHU library e-book)**

J. Ye and S. T. Cundiff, *Femtosecond optical frequency comb: principle, operation and application*, 1st Ed, (Springer, 2004). **(NTHU library e-book)**

F. X. Kaertner, *Few-cycle laser pulse generation and its applications*, 1st Ed, (Springer, 2004). **(NTHU library e-book)**

Recent journal articles.

Teaching Method:

Lectures in English; discussions in Chinese/English.

Chen-Bin Huang

Course Content:

- ➤ Brief review to *Ultrafast Optics*
- ➤ Second-order ultrafast nonlinear optics
- ➤ Third-order ultrafast nonlinear optics
- ➤ Generation and applications of optical frequency combs
- ➤ Manipulations of ultrashort optical pulses
- ➤ Ultrafast optics in plasmonics (if time allows)

Grading:

Homework (40%)

One examination (30%)

Final project (30%)

For this semester, I would like to experiment with a new definition of "homework".

1. Instead of me giving out problems, I'd like you to come up with questions and provide adequate answers.
2. I plan on having regular paper studies. My plan is at the end of each topic, each person (or as a group of 2~3) will share a recent paper. The main theme is trying to link the underlying working principle to what is covered in the lecture.
3. I also intend to have you perform simulations. It can be self-written codes or using commercial software. Still undetermined, everything is experimental, rough but will be exciting!

Chen-Bin Huang