האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

# *The Hebrew University of Jerusalem*

## *Syllabus*

# *QUANTUM ELECTRO-OPTICS B: NONLINEAR OPTICS - 83876*

*Last update 04-11-2018*

*HU Credits: 3*

*Degree/Cycle: 2nd degree (Master)*

*Responsible Department: Applied Physics*

*Academic year: 0*

*Semester: 1st Semester*

*Teaching Languages: Hebrew*

*Campus: E. Safra*

*Course/Module Coordinator: Dan Marom*

*Coordinator Email: danmarom@mail.huji.ac.il*

*Coordinator Office Hours: coordinate via email*

*Teaching Staff:*
*Dr. Liron Stern*

*Course/Module description:*
*Nonlinear optical susceptibility*
*Wave-equation description of nonlinear optical interactions*
*Nonlinear processes: harmonic generation, three-wave mixing, four-wave mixing*
*High Harmonic Generation*
*Phase matching techniques, quasi phase matching*
*Intensity-dependent refractive index, solitons*
*Brillouin scattering, Raman scattering, slow light*
*Semiconductor nonlinearities*

*Course/Module aims:*
*Learn about the nonlinear phenomena in optics and its applications.*

*Learning outcomes - On successful completion of this module, students should be able to:*
*Working knowledge of nonlinear optics.*

*Attendance requirements(%):*
*0%*

*Teaching arrangement and method of instruction: Lecture*

*Course/Module Content:*
*Nonlinear optical susceptibility*
*Wave-equation description of nonlinear optical interactions*
*Nonlinear processes: harmonic generation, three-wave mixing, four-wave mixing*
*High Harmonic Generation*
*Phase matching techniques, quasi phase matching*
*Intensity-dependent refractive index, solitons*
*Brillouin scattering, Raman scattering, slow light*
*Semiconductor nonlinearities*

*Required Reading:*

*R. W. Boyd, Nonlinear Optics, 2nd ed., 2003 (3rd edition, 2008, exists too).*

*Additional Reading Material:*

*P. N. Butcher and D. Cotter, The Elements of Nonlinear Optics, 1st ed., 1990.*
*Y. R. Shen, The Principles of Nonlinear Optics, 1st ed., 1984.*
*A. Yariv, Optical Electronics, 4th ed., 1991 (superseded by Optical Electronics in Modern Communications).*

*Course/Module evaluation:*

*End of year written/oral examination 70 %*
*Presentation 0 %*
*Participation in Tutorials 0 %*
*Project work 0 %*
*Assignments 30 %*
*Reports 0 %*
*Research project 0 %*
*Quizzes 0 %*
*Other 0 %*

*Additional information:*