# PHZ3113-2916(18565) - Intro Theoret Physics

**Instructor:** Prof. Yuxuan Wang (Office: 2116 NPB, Email: yuxuan.wang_at_ufl.edu)
**Objective:** Build the mathematical foundations for introductory theoretical physics, including classical mechanics, electrodynamics as well as quantum mechanics.
**On inclusion and diversity:** Physics is practiced and advanced by a scientific community of individuals with diverse backgrounds and identities and is open and welcoming to everyone. The instructional team recognizes the value in diversity, equity and inclusion in all aspects of this course. This includes, but is not limited to differences in race, ethnicity, gender identity, gender expression, sexual orientation, age, socioeconomic status, religion and disability. Students may have opportunities to work together in this course. We expect respectful student collaborations such as attentive listening and responding to the contributions of all teammates.
Physics, like all human endeavors, is something that is learned. Our aim is to foster an atmosphere of learning that is based on inclusion, transparency and respect for all participants. We acknowledge the different needs and perspectives we bring to our common learning space and strive to provide everyone with equal access. All students meeting the course prerequisites belong here and are well positioned for success.
**Masks and Public Health:** It is expected that all of us will be wearing masks during class meetings. During in-person office hours, all of us will be required to wear a mask. All participants are strongly encouraged to get fully vaccinated to protect each other.
**Textbook & Lecture notes:**
**The main lecture content we will use are the lecture notes**

**specifically developed for this course at UF. They are uploaded under the Files tab.**
Recommended: *Mathematical Methods for Physics and Engineering*, by K.F. Riley, M.P. Hobson and S.J. Bence, 3rd Ed., Cambridge University Press (2006).
Other good reference books:
(1) *Mathematical Methods for Physicists*, by G.B. Arfken and H.J. Weber, 5th Ed., Harcourt/Academic Press (2001).
(2) *Mathematical Methods in the Physical Sciences*, by M.L Boas, 3nd Ed., Wiley (2005).
**Class Meet at Mondays, Wednesdays, and Fridays Period 6 12:50 to 1:40**
**Office hours:** Tuesdays and Thursdays from 12:50 to 1:40 online. Additional in-person office hours to be announced.
**Grading policy:** Homework and final exam.
There will be daily homework assignments, due at the beginning of the next lecture. (For medical or other excused absences, see me or send email for approval to submit late.) There will also be three closed-book exams. The total grade will derive 1/3 from homework and 2/3 from the three exams. The weight of each exam will be adjusted according to their difficulty levels.
Grades are assigned to according to the following.

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|---|---|---|---|
| A | 90-100 | A- | 85-90 |
| B+ | 80-84 | B | 70-79 |
| B- | 65-69 | C+ | 60-64 |
| C | 50-59 | C- | 45-49 |
| D+ | 40-44 | D | 35-39 |
| D- | 30-34 | E | <30 |

**Syllabus:**

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|---|---|
| Week of Aug 23 | Overview, Euler-Lagrange equations |
| Week of Aug 29 | No Class |

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| Week of Sep 8 | Classical field theory, Lagrange multiplier method, Hamilton's Equations |
| Week of Sep 20 | Vector and Vector fields, Vector products with Levi-Civita tensor |
| Week of Sep 27 | Curvilinear coordinates, gradient, divergence, curl, delta function |
| Week of Oct 4 | Electrodynamics, Review for Exam 1 |
| Oct 8 | Exam 1 |
| Week of Oct 11 | Matrices, Similarity transform, Matrix diagonalization |
| Week of Oct 18 | Normal modes; Complex variables; Application of complex numbers |
| Week of Oct 25 | Complex functions; Conformality; Residue theorem |
| Week of Nov 1 | More fun with complex integrals; Linear vector space; Primer to quantum mechanics |
| Week of Nov 8 | Quantum mechanics of harmonic oscillators; Fourier series |
| Week of Nov 15 | Review; Exam 2; Fourier transform |
| Nov 22 | Phonons |
| Week of Nov 29 | Photons; Ordinary Differential Equations; Partial Differential Equations |
| Dec 6 | Green's function method |
| Dec 8 | Final Review |
| Dec 15 | Final exam |

Last updated: 8/17/2021