PHY 557, Spring 2021 Syllabus

This class will meet Tuesday and Thursday from 8:00am to 9:20am. The class will be held online on Zoom. The Zoom sessions will be accessible through the Zoom links on blackboard. Assignments will be submitted to Prof. Wilking and Prof. Piacquadio via e-mail.
The final project talks may be scheduled to be in person, this will be communicated in due time.

Course Zoom Link

Please login to blackboard to get the Zoom link. In Zoom you need to be logged into your Stony Brook account in order to connect to the meeting. There is also a mobile phone app that can be used to connect to class. Please contact Prof. Wilking and Prof. Piacquadio if you have any difficulties setting up zoom.

Instructors

The PHY 557 instructors are

- Prof. Michael Wilking, Physics D-106, 631-632-8087, Michael.Wilking_at_stonybrook.edu
- Prof. Giacinto Piacquadio, Physics D-143, 650-669-7296, Giacinto.Piacquadio_at_stonybrook.edu

For the actual email addresses substitute @ for (at). The best way to reach your instructors is by email; put PHY557 somewhere in the subject line of your message.

Blackboard

Most of the course administration will be done via Blackboard. Please make sure that you have access to your Stony Brook Blackboard account, that this course is listed there (in 1st week of classes for sure), and that the email address listed in your Blackboard account is one that you monitor.

Office Hours

We will use a doodle poll to select office hours for the course instructors. Office hours are held in the office listed at the top of the syllabus or per Zoom. Office hours will be held beginning the 2nd week of class.

Course content

This course gives a lightweight introduction to the theory describing the interaction of elementary particles, and gives an overview of some of the past, present and future experiments that have been devised to test such theory in its many different aspects.

In terms of theory, a basic introduction to special relativity applied to particle collisions and to practical concepts of quantum field theory applied to quantum electrodynamics will follow the treatment of Textbook reference [2], while the introduction of QCD (quantum cromo-dynamics), weak interactions, CP violation, and of the Higgs field will follow Textbook reference [1]. In terms of experiments, emphasis will be posed on past, present and future experiments testing neutrino oscillations, CP violations both in the quark and in the neutrino sector, precision tests of electroweak interactions and measurements of the Higgs boson (the latter partially following Textbook reference [3]).

For a more in depth/mathematically more rigorous introduction to Quantum Field Theory applied to particle physics, other graduate courses are suggested, such as PHY612.

Textbook

There is no required textbook, and lecture notes will be put online after the end of each lecture. However some of the material will be drawn from:
[1] M. Thomson, Modern Particle Physics, Cambridge University Press 2013
[2] P. Pal, An Introductory Course of Particle Physics, CRC Press 2015
[3] A. Nisati, V. Sharma, et al., The Discovery of the Higgs Boson, World Scientific 2016

Course Evaluation

Your final grade will be based on the following.

- 70% Homework
- 30% Final Project/Presentation

There are no extra credit or other special supplementary assignments available.

Homework

Homework problems will be a combination of questions and practical problems to be solved using appropriate computer data and codes which will be provided in the course. They will typically be assigned on Thursdays, and due in class the following Thursday.

Final Project and Presentation

A final project on an experimental particle physics measurement is required. This involves a short (5 page) report, which includes an explanation of the theory, experimental design, event selection, important backgrounds, and important systematic uncertainties of the measurement. A 20 minute presentation on the result will then be given to the rest of the class (15 minutes + 5 minutes of questions). More details will be provided in the formal assignment handout.

Technical and Software requirements

Since the course will be held mostly or entirely online, a computer with a working microphone and a camera is needed in order to use the Zoom client and connect to the course lectures. In addition, some of the problems to be solved may also require running software (provided in the course) on a standard computer with either Windows or Linux.

Academic Honesty

Academic dishonesty will not be tolerated. In this course, you are encouraged to work with other students, but all turned in assignments must be the unique work of the student. Egregious violations of this policy may result in a lower (possibly failing) course grade, and/or referral to the University academic judiciary (see below).

Standard University Policy

ELECTRONIC COMMUNICATION POLICY FOR ALL STONY BROOK STUDENTS: Email to your University email account is an important way of communicating with you for this course. For most students the email address is 'firstname.lastname@stonybrook.edu', and the account can be accessed here: http://www.stonybrook.edu/mycloud. **It is *your responsibility* to read your email received at this account.**

For instructions about how to verify your University email address see this: http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo . You can set up email forwarding using instructions here: http://it.stonybrook.edu/help/kb/setting-up-mail- forwarding-in-google-mail . **If you choose to forward your University email to another account, *we are not responsible for any undeliverable messages*.**

Student Accessibility Support Center Statement

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website: http://www.stonybrook.edu/ehs/fire/disabilities.

Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.